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LECTURES

*Course
for
Dental Assistants*

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PREPARED BY THE
ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO
IN CO-OPERATION WITH THE
ACADEMY OF DENTISTRY, TORONTO
AND THE
ONTARIO DENTAL NURSES' & ASSISTANTS' ASSOCIATION

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P R E F A C E

In 1960 the Royal College of Dental Surgeons of Ontario in co-operation with the Toronto Academy of Dentistry conducted a pilot model for Dental Assistants in Toronto. The Ontario Dental Nurses' and Assistants' Association saw fit to recognize the successful completion of this program as providing the academic qualification which, in company with other requisites, would entitle an eligible applicant to obtain certification in dental assisting. Similar programs have, since 1960, been instituted in several other areas of the province.

From time to time requests have been received for copies of the original lecture material for at least two purposes:

- (1) To be used by lecturers as a base from which they could develop their own presentations.
- (2) To be utilized by dental assistants or by aspiring dental assistants who reside in areas remote from centres at which similar evening course programs are being conducted.

Appreciation is expressed to each of the Lecturers for permitting utilization of his material in this fashion.

LECTURES

COURSE FOR DENTAL ASSISTANTS

These lectures were presented as a portion of the pilot course sponsored by the Royal College of Dental Surgeons of Ontario in co-operation with the Toronto Academy of Dentistry, during the academic year 1960-1961.

INDEX

<u>Page</u>	<u>Subject</u>	<u>Lecturer</u>
1	The Dental Assistant in the Profession	Wesley J. Dunn, D.D.S.
15	General Office and Patient Routine	Marjorie Jackson, D.D.S.
31	Telephone Usage	Mrs. Anne Armstrong
33	Department and Good Grooming	Miss Elizabeth Neelin
38	Terminology	H.R. Skilling, D.D.S.
45	Professional Records	M.A. Kamienski, D.D.S.
50	Accounting in a Dental Practice	W.E. Jackson
56	Supplies	Miss E. McMullin
61	Dental Anatomy and Physiology	K.J. Paynter, D.D.S.
72	Function and Care of Dental Equipment	J.E. Inch
79	Dental Hand Instruments and Their Care	Miss Welda Leask
84	Operative Dentistry	Walter Pressey, D.D.S.
91	Dental Radiography	D.C. Teskey, D.D.S.
106	Paedodontics	E.R. Bilkey, D.D.S.
110	Diet, Nutrition, and Oral Hygiene	Mrs. B. Brown, R.D.H.
124	Orthodontics	W.J. McColeman, D.D.S.
131	First Aid	Mrs. Alayne Scanlon
137	Pathology	J.E. Speck, D.D.S.
151	Bacteriology	A.W. Chapple, D.D.S.
165	Endodontics	J.M. Phillips, D.D.S.
176	Oral Surgery	D.H. MacDonald, D.D.S.
183	Pharmacology	J.F. Methven, D.D.S.
193	Dental Materials	E.G. Sonley, D.D.S.
204	Gold, Gold Foil, Rubber Base and Silicone Impression Materials	A.B. Hord, D.D.S.
214	Silver Amalgam Procedure	D.B. McAdam, D.D.S.
221	Dental Cements	F.T. Pearson, D.D.S.
228	Crown and Bridge Prosthodontics	P.A. Scott, D.D.S.
238	Prosthodontics	W.D. MacKay, D.D.S.
252	Dental Public Health	T.J. Gavriloff, D.D.S.
282	Dental Research	G. Nififoruk, D.D.S.
286	Associations	Mrs. June Cook

Royal College of Dental Surgeons of Ontario
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Toronto, Ontario.

1 THE DENTAL ASSISTANT IN THE PROFESSION

1. GENERAL DESCRIPTION AND CHARACTERISTICS OF THE POSITION

Dental Assistant assists the dentist in general office routines to permit the dentist to direct his efforts to actual patient care. The dentist establishes office policies and the assistant follows them out.

The Dental Assistant works with the dentist and her position requires

- (1) Initiative
- (2) Diplomacy
- (3) Skill
- (4) Knowledge

2. AREAS OF SERVICE OF THE DENTAL ASSISTANT

The Dental Assistant may serve the profession in:

- (1) Private practice, general and specialized.
- (2) Group practice.
- (3) Hospital or School Clinics.
- (4) Public Health Departments at local, provincial or Federal levels.
- (5) The Armed Forces - Royal Canadian Dental Corps.

As the Dental Assistant may be the only employee in a private dental office she may assume the following duties:

- (1) Receptionist - meeting and addressing patients
 - presenting patients to dentist or business secretary
 - answer telephone
 - initiate calls
- (2) Chairside Assistant
 - assist in treatment procedures
 - clean and sterilize instruments
 - prepare operatory
 - receive and dismiss patients
- (3) Business Secretary
 - make financial arrangements with patients
 - send statements
 - pay outstanding bills
 - order supplies
 - Maintain books of account
- (4) Laboratory Assistant - usually perform simple laboratory functions as assigned by dentist.

3. INDIVIDUAL REQUIREMENTS OF THE POSITION

- (1) Health - good physical and mental health are requisite. Inadequate rest, intemperance, and improper dietary habits reflect upon efficiency and conduct.
- (2) Education - Very little opportunity has been presented, to date, for formal training. Most Dental Assistants learn through "apprenticeship" and the period of time to learn varies greatly. There is no standard educational requirement but three or four years of High School are generally desirable.

Grammar is important for individuals who would lend dignity and professional stature to the office. Pronunciation and use of words must be clear and correct. The Dental Assistant must appreciate social and professional etiquette.

- (3) Personal and Physical Characteristics - The Dental Assistant conveys an impression to the patient even before the dentist, therefore a well-groomed, intelligent, and courteous office representative will attract many individuals into the practice. The Dental Assistant should:
 - (1) like people, naturally
 - (2) like her work
 - (3) express personal enthusiasm and sincerity
 - (4) understand and be interested in patients
 - (5) recognize problems in patient relations and be diplomatic in their solution
 - (6) give attention to personal appearance, neatness, thoroughness, promptness, loyalty, and reliability
 - (7) manifest poise and self-composure

4. DENTAL ASSISTANT'S IMPORTANCE TO DENTISTRY

Dentistry is an integral part of a total health service. The practice of dentistry, then, is extremely important to the health and welfare of the individual, the family, the community, and the nation. The contribution of the Dental Assistant is significant because in assuming the non-professional responsibilities of the office she permits the dentist to render a greater health service to more people.

5. OTHER AUXILIARY PERSONNEL

In addition to the Dental Assistant some offices receive the services of

- (1) Dental Hygienists
- (2) Dental Technicians

- (1) Dental Hygienist - this is a woman who has graduated from an approved Course in Dental Hygiene who has become registered and licensed to practise Dental Hygiene in a particular province. She is legally entitled, under the direct supervision and control of a dentist to (a) perform prophylaxis, (b) take radiographs, (c) act as a dental health educator, and (d) apply topical fluorides to the teeth.

Only one course is presently available in Canada at the Faculty of Dentistry, University of Toronto. The admission requirement is Ontario Grade XIII or its equivalent and the course is two years' duration.

- (2) Dental Technician - The dental laboratory technician is found, generally, in commercial dental laboratories although there are some who are employed by dentists in private practice. There is no training program, as yet, in Canada for technicians and most receive their training by the apprenticeship method. Dental technicians perform technical procedures in the laboratory as such procedures pertain to the construction of various dentures, bridges, crowns, splints, and appliances for patients. Dental technicians perform the technical services required on the basis of written instructions from the dentists.

6. PRINCIPLES AND CODE OF ETHICS

(1) Development of a Profession

The development of a profession is a very gradual process. The profession has been recognized as the highest calling or vocation. Essentially there exist 3 main professions, the Church - the law - and the medical sciences which include dentistry. All were originally practised by priests, some of whom became more expert in caring for the physical ills. It was only natural that eventually some priests became more expert in law or medicine and the end result was that some became physicians and lawyers, separating themselves as a group from the priests.

Dentistry is a young profession, as it is only within the last century that dentistry has been recognized as a separate profession. A profession only becomes a profession when recognized by society as a whole on a broad basis. Professional status has always been a position to be attained and if such stature is reached it then becomes a task to retain it.

There are three main points of differentiating a profession from other vocations:

- (1) Specialized knowledge
- (2) Continuing education
- (3) Service

(1) Specialized Knowledge

The term profession indicates that the member professes the possession of specialized knowledge. He has a long educational experience behind him, has acquired an aptitude to put this knowledge to beneficial use and has acquired understanding not possessed by others. Professional standing demands that the member not only knows "how" but he also must know "why". Herein lies one of the main differences between a profession and other vocations.

(2) Continuing Education

In many vocations limits are reached in education, not so in a profession. Knowledge in a trade is by and large self-limiting. The professional man's life is one of continuing education. He is not only expected to keep up with scientific developments, but he will also be expected to make a contribution to the body of knowledge belonging to his profession.

(3) Service

The term profession suggests that the member of a profession services, that he is interested in helping people, and that he measures his success by what he has done for mankind and not alone by what he has done for himself. In professional life, service is and must always be the first motive. All else is secondary.

(2) Ethics

Early in the history of the professions, the need was felt for the setting up of strict rules of conduct for the members, in order to sustain the principles for which the profession stood.

These rules or guides are known as "codes of ethics". Ethics is the science of morals or study of the principles defining man's duty to his neighbours.

(3) Ethics Applied to the Vocations of Life

Every man and woman having sufficient health and mental capacity should be engaged in some form of employment or service useful to society. Such employment as is injurious or useless ought not to be thought respectable. The most important ethical requirement in every transaction is that all parties are benefitted by it. Any transaction which does not admit benefit to both parties in the transaction is not a legitimate one.

1. Buyer and Seller - In the ordinary commercial transactions of buying and selling, the parties are supposed to meet on equal terms, each able to look out for his own interest. It is required of the seller that he tell the truth about what he sells.
2. Employer and Employee - In the relationship between employer and employee the human element enters with more importance than between buyer and seller, and the employer does have some responsibility for the welfare of his employees. Such welfare however, is not the primary consideration of the employer. The first objective of the automobile manufacturer is to make and sell automobiles or he would not hire employees.
3. Practitioner and Patient - In such professions as dentistry and medicine the human element becomes of primary and chief importance. The practice of dentistry and medicine consists wholly of personal services to supply personal needs and if the making of something becomes involved while rendering those personal services it occupies a subordinate and comparatively insignificant role. In this relationship the practitioner and patient do not meet on equal terms. There is more responsibility on the part of the practitioner and therefore a greater need for high ethical concepts.

The relationship between the dentist and his patient is a trust, confided to the dentist by his patient, who entrusts her future comfort and health to the knowledge, skill, judgement, sincerity and honesty of the dentist. Professional knowledge and skill implies more than technical skill and knowledge.

A price is supposed to bear some definite relationship to the cost of an article and wages or salary have a rather definite relation to time consumed of the person employed. A much greater flexibility exists in the matter of fees because several additional items enter into the determination of them. Cost and time involved are factors in setting a fee, but skill, knowledge and judgement required are

more important. The patient's position is therefore one of faith or trust in the dentist.

(4) Professionalism Versus Commercialism

The objective in practising a profession is opposite to that of carrying on commercial activity. The aim of all business is to make as large a profit as the market will permit. This is quite legitimate in commercial life but is the antithesis of practising a profession.

A professional man cannot sell health services. Immediately that he attempts to do so his service deteriorates, for the emphasis becomes placed on profit rather than service. The best possible service to the patient must always be the first motive.

In commerce there are many grades of merchandise and the price varies according to the grade. In the true profession, grades are non-existent - only one standard exists which is the best that can be rendered both from the standpoint of personal service and the materials used to supply the service.

(5) Code of Ethics

In order that the Dental Assistant may fully appreciate the stature of the dental profession and be aware of the Code of Ethics to which all members of the Canadian Dental Association subscribe, the Code is herewith attached.

(See Code of Ethics as published by the Canadian Dental Association)

7. LAW AND THE PRACTICE OF DENTISTRY

Jurisprudence is the science of human law.

(1) Origin of Law

The origin of law in Canada is from two sources. (1) judgements of courts (2) statutes. Any new law, amendment to any law or revocation of any law originates from one of these sources.

- (1) Our system of jurisprudence follows the English principle in that a judgement of a Court is binding upon all inferior Courts in dealing with the same type of case. When a judgement is pronounced, the Court may be enunciating some new legal principle or revoking or amending the law as it was

previously understood. Consequently the Courts are one of the main sources of law.

Parliament has the power to legislate upon any subject, to reverse a decision of any court, to declare, revoke or amend any law. Consequently, parliament is the other main source of law.

Under the constitution of Canada as enacted in the British North America Act, the legislative authority is divided between the Parliament of Canada, and the Legislatures of the Provinces. The authority of either body is supreme provided the legislative body is legislating in respect of a subject assigned to it under the B.N.A. Act.

(2) Delegated Legislation

A type of legislation which has become voluminous in latter years is known as delegated legislation. In this form of legislation the legislative body (Parliament or Legislature) delegates the authority to some subordinate body. An example of delegated legislation is the procedure whereby a provincial legislature enables a municipality to pass By-Laws. A municipality is a creation of the Legislature and a municipality has only such legislative powers as are conferred upon it by the Legislature.

Many examples could be cited of instances where Parliament or a Legislature has delegated some degree of legislative authority to a subordinate body, board, corporation, commission, etc. Such subordinate body has power to enact regulations or by-laws. We will return to this matter of delegated authority later when the authority under which dentistry is practised is discussed.

In ascertaining the law respecting any matter, it is necessary to find any decisions of the Courts and what the Courts have declared to be the law. It is also necessary to learn the constitutional status of the subject, whether it is a matter assigned to the Federal Parliament or the Provincial Legislatures, and whether the appropriate body has passed any acts dealing with the subject. A search must be made to see whether there is any delegated legislation upon the subject.

In addition it is to be remembered that law does not stand still because new judicial pronouncements and legislative action to repeal, alter existing laws and create new laws are constantly occurring.

(3) Actions in Respect to Negligence

Negligence is the omission to do something which a reasonable man, guided upon those considerations which ordinarily regulate the conduct of human affairs would do, or doing something which a prudent or reasonable man would not do.

Malpractice is improper treatment of a patient by a practitioner whereby the patient is injured. Actions for malpractice hinge around negligence on the part of the practitioner and consequently it is most important that the dentist or dental assistant understand what is meant by "negligence".

(4) Obligations of the Dentist

(1) Reasonable Care

When a dentist undertakes to treat a patient he is under duty to exercise reasonable care in a professional respect. A failure to exercise reasonable care is negligence rendering the dentist liable for any injury sustained by the patient. This does not depend upon any contract between the patient and the dentist. This applies even where the dentist is providing his services without fee.

(2) Professional Skill

If the dentist undertakes to perform services which he knows may be beyond his professional skill it may be considered negligence. The practitioner is held responsible for the service which he holds himself out as competent to perform.

(3) Degree of Skill

The degree of skill is apt to become an important consideration. Lack of skill is not in itself negligence but the fact that the practitioner holds himself out as competent to perform services which he knows he is not competent to perform may amount to negligence.

From the legal standpoint the practitioner is circumscribed to do what he can prove he was trained to do.

The position of the dentist in respect to an employee in his office is clear. A General principle exists whereby the employer is liable for the negligent acts of an employee. In such cases action is usually brought against both the employee and the dentist.

(5) Points in Dental Practice re Negligence

(1) Carelessness

Carelessness is never an excuse at any time even if it can be shown that others have been similarly careless.

(2) Usual Treatment

It is important that the practitioner can show by expert evidence that the treatment given was such as a practitioner of ordinary knowledge and skill would and ought to have given.

A practitioner is judged in the light of the particular circumstances attaching to the case and having regard to how other practitioners of similar skill and status to himself would have acted if faced with the same problem.

It should be pointed out that not only does the standard vary having regard to the circumstances but it also varies having regard to what is generally practised. Standards are constantly changing - e. g. twenty-five or thirty years ago a practitioner who did not sterilize his instruments thoroughly would hardly have been found guilty of negligence. Today it is generally recognized throughout the profession that the proper sterilization of instruments is of utmost importance, and in consequence a practitioner, who does not carry out recognized methods of sterilization and whose patient suffers in consequence, can consider himself fortunate if he is not faced with an allegation of negligence.

(3) Records

One of the most important matters, and often neglected in dental practice is the keeping of complete records. In case of any legal difficulty such records become vitally important. Dates and entries at the time the services were performed are of the utmost value in Court. Every dentist should keep an accurate record of every operation, and particular note should be made of any out of the ordinary incident which may occur.

(6) Ten Simple Rules to Help Prevent Malpractice Suits

1. Avoid arguments with patients who complain of grievances, real or fancied.
2. Keep complete and accurate records.

3. Refrain from guaranteeing or even promising a perfect result.
4. Follow approved methods of practice.
5. Be just as careful in the post-operative treatment as in the main operation.
6. When faced with an extraordinary situation, do not mark time, delay, or otherwise avoid the issue. You should face it squarely and if in doubt you should call another dentist for consultation, preferably a specialist in the particular type of treatment.
7. Never conceal any important fact from your patient, even where you may fancy the patient will never discover the error, mistake, or poor result.
8. When confronted by a serious question of law pertaining to dental practice you should seek the advice of the Dentists' Legal Protective Association, before making a statement either written or oral.
9. Do not criticize another practitioner's treatment or advice.
10. Avoid accidents in the handling of caustic medicaments, burs and discs.

(7) Consent for Treatment

It is unlawful to perform any operation for a patient without the consent of the patient. A parent or guardian may give consent for the examination and treatment of a child.

(8) Secrecy

In the pursuit of practice the dentist or dental assistant through examination or otherwise, often comes into possession of personal knowledge respecting the patient. Care should be exercised in respect to such knowledge.

1. It is a breach of a recognized obligation to disclose personal knowledge of a patient which should be a professional secret.
2. A patient may sue for defamation either as libel or slander. Libel is written whereas slander is spoken.

(9) Contracts - Dental Practice

In all his relationships with the patient, the dentist makes a contract. It is not necessary that a contract be made in writing. It may be and usually is by custom in ordinary practice an implied one. The fact that the patient comes to the dentist and proceeds to have the dentist perform services, presupposes the existence of a contract. The contract means that the dentist undertakes to perform services which he holds himself out as capable of performing with reasonable care and skill and the patient promises co-operation and payment for services.

(10) Licensing of Dentists

In Canada the licensing of members of professions is entirely a provincial matter. Each province has enacted a Dentistry Act. These Acts vary to some extent as to detail but in all cases give control of licensing to a Dental Board or Council.

Earlier reference was made to delegated legislation, whereby the legislature passed an Act in general terms and permitted a subordinate body (board) to draw by-laws or regulations for its implementation. The Acts respecting professional bodies are in this category.

In March 1868, the Dentistry Act of Ontario was passed. The Act has been amended many times since that date but it is commonly recognized as being one of the first, and also one of the best in existence.

(11) Delegated Legislation

The Dentistry Act of Ontario created the Royal College of Dental Surgeons of Ontario. Everyone who engages in the practice of Dentistry in Ontario must be a registered member of the College.

For administration purposes the Act provides for the election of a Board of Directors from among the members of the College, consisting of nine members. The province is divided into eight electoral districts and once every two years an election is held. The members practising in each electoral district elect one of their number to the Board of Directors. At the same time the Faculty of Dentistry, University of Toronto, elects one of their number to the Board. The Board possesses wide powers under the Act for the regulation of the dental profession within the province.

The Board sets up by-laws and regulations for the protection of the public and the guidance of the dental profession; sets requirements for applicants for membership; prosecutes those who attempt to practise without a licence; suspends or cancels licences of members; takes disciplinary action, when necessary, against its members, and many other activities considered in the interest of the public and profession.

GLOSSARY OF TERMS

The following terms appear within the lecture outline for "The Dental Assistant in the Profession" and in the context in which the terms are employed they are herein defined:

Appliance	a device used in the mouth to produce or prevent movement of the teeth.
Bridge	an appliance made of artificial crowns of teeth to replace missing natural teeth.
Bur	a cutting instrument with a rounded, pointed, cylindrical or ovoid head having numerous blades, and operated usually in the handpiece of the dental engine for preparing cavities in teeth to receive fillings.
Crown	the top part of anything. An artificial crown is a cap of metal, plastic, or porcelain processed to cover that portion of the tooth which projects beyond the gum line.
Denture	the natural or artificial teeth of an individual considered as a unit. An artificial denture is a replacement of either the upper or lower teeth.
Disc	a small wheel of sandpaper or other abrasive material that fits into the handpiece of the dental engine for assisting in the preparation of teeth to receive fillings or crowns.
Fluoride	a compound, usually stannous fluoride or sodium fluorid which in stipulated portions may be dissolved in distilled water and used to paint all surfaces of the teeth to assist in the prevention of tooth decay.
Medicament	a medicinal substance. Pertaining to a medicine or to healing.

GLOSSARY OF TERMS

(continued)

Prophylaxis	cleaning and polishing the teeth.
Radiograph	an X-ray photograph used as an aid in diagnosis and treatment.
Splint	an appliance employed to hold two or more teeth together to assist in distributing the work-load of each tooth.

QUESTIONS AND ANSWERS

1. How may the Dental Assistant serve best in providing dental service to the public?

By exhibiting sufficient initiative to provide the greatest number of non-professional services in the dental office to free the dentist as much as possible to render dental care services to more people.

2. Give at least five personal characteristics desirable in a dental assistant.

1. Likes her work
2. Expresses personal enthusiasm and sincerity.
3. Understands and is interested in patients.
4. Gives attention to personal appearance, neatness, thoroughness, promptness, and is loyal and reliable.
5. Manifests poise and self-composure.

3. What are the three basic characteristics of a profession?

1. Possession of specialised knowledge.
2. Continuing education.
3. Emphasis on service.

4. What is a Code of Ethics of a profession?

A Code of Ethics is a statement of the broad principles which should permit members of the profession to appraise and govern their own pattern of conduct.

QUESTIONS AND ANSWERS (Continued)

5. Define "negligence" and "malpractice".

1. Negligence is the omission to do something which a reasonable man, guided upon those considerations which ordinarily regulate the conduct of human affairs would do, or doing something which a prudent or reasonable man would not do.
2. Malpractice is improper treatment of a patient by a practitioner whereby the patient is injured.

6. What are the legal obligations of a dentist to his patient?

A dentist is obligated by law to use reasonable care and employ the best judgement of which he is capable.

The Dental Office

Reception room furnishings, operatory equipment and business office layout have a great bearing not only upon the patient's attitude to the office but also upon the efficiency of the practice management. Tidiness and cleanliness are of paramount importance in the office of anyone associated with the health of the public.

1. OFFICE SPACE AND ARRANGEMENT

This depends upon:

- (a) space available
- (b) type of practice
 - 1. general practice - large city
 - rural area
 - 2. specialty - Oral Surgery
 - Orthodontics
 - Paedodontics
 - Periodontics

(a) Space available1. Reception Room

This is frequently referred to as the waiting room but it should be called by its rightful name - the Reception Room. Patients do not like to be kept waiting for their appointments although sometimes emergencies do arise in any Dental Office when it is unavoidable. It is in this room that patients are welcomed, received and dismissed by the nurse.

- it may be self contained or
- it may be shared with one or more other practitioners

2. Operatory

- frequently referred to as operating room, surgery or treatment room.
- may be one or more rooms.
- may be one or more for general practice.
- may have one for radiography
- may have one for surgery

3. Laboratory

- usually one room
- size depends upon available space and the type of practice
- may be combined with dark room

4. Business Office

- usually a separate office for the assistant or secretary dependant upon the number of auxiliary personnel employed
- may be a separate private office for the Dentist

5. Dark Room

- for developing X-ray pictures

6. Recovery Room

- may be one or more

(b) Type of Practice

1. General

The rooms as listed in the previous section are usually found in any General Practitioner's office whether located in a city or rural area. The number and arrangement is dependant upon the requirements and wishes of each practitioner.

2. Specialty

Offices of specialists have to some degree the same basic set up as the general practitioner's with a few minor changes.

Examples: Orthodontics - Laboratory facilities are usually larger and rarely have recovery rooms.

 Oral Surgery- Frequently have separate rooms for local and general anaesthetics and they have more recovery rooms.

2. DESCRIPTION AND USE OF VARIOUS ROOMS

(a) Reception Room

This is where the patient receives his first impression of the office and it is here where the assistant receives the patients. Therefore both the room and the assistant must present a favorable impression. The reception room generally resembles a living room in a home and the decor represents the Dentist's interests in interior decoration. It is furnished with durable seating facilities, tables, ash-trays, mirrors, pictures and lamps. A good selection of reading material which would appeal to men, women and children is very important. Magazines should be kept up to date and old and torn issues destroyed immediately.

Many Dentists keep a separate area for educational material such as tooth brushing, food rules to follow and the care of children's teeth. These are supplied in pamphlet form and the assistant should acquaint herself with all such available material in order that she may assist in the Dental Public Health Educational Programme of the office.

(b) Operatory

In a general practitioner's office all forms of dental treatment are carried out here. These rooms are equipped with such pieces of equipment as:

- Dental Unit
- Dental Chair
- Instrument and supply cabinets
- Waste Receiver
- Wash basin - preferably with elbow or foot controls
- Sterilzer - this may be in a separate sterilizing room
or area
- X-ray Machine - preferably in a separate lead-lined room

Specialists' offices are equipped in the same manner with additions or deletions dependant upon the type of specialty.

(c) Dental Laboratory

The amount of equipment found in the laboratory is dependant upon the amount and kind of laboratory work carried through in the particular office.

They may be equipped as follows:

- casting machine
- plaster and stone and investment bins
- usually contains the cupboard and storage space for laboratory equipment and consumable material for conducting the practice.

(d) The Business Office

It is preferable for the assistant to have a separate business office adjacent to the reception room and operatory. Here the business of the practice is conducted.

- example:
- appointments made
 - charts recorded and filed
 - correspondence
 - accounts
 - book-keeping

- contains:
- telephone
 - desks
 - typewriter
 - filing cabinets

Many have a separate room which the Dentists use as a Private Office where they attend to their individual business matters and conduct their patient consultations.

(e) Recovery Room

This room contains a bed with blanket and, frequently, sheets. Patients, particularly following oral surgery, are required to rest for a short time before leaving the office.

(f) Dark Room

Here X-ray pictures are developed and the room contains the following:

- tanks for fixing and developing solution
- basin equipped for continuous water flow for washing films
- time clock
- safety light
- lock on inside of door
- racks on which films are processed

THE ASSISTANT

Factors Influencing Her Position And Value to the Office

1. Initiative

In any well conducted office the assistant will be assigned duties and responsibilities. These become her own particular field of operation and the Dentist depends upon her to fulfill them. These include such duties as the following:

- keeping the reception room neat and clean
- receiving patients promptly
- answering telephones courteously
- cleaning the operatory in preparation for the next patient
- sending out monthly accounts
- keeping consumable supplies on hand

The assistant should be able to anticipate the needs of the Dentist and the Patient without having to be told and reminded. She should have foresight in preparation and be ready for any emergency.

2. Friendliness and Familiarity

Friendliness is reflected by sympathy and a smile which must be sincere and worthwhile. Pleasantness is absolutely necessary even at the end of a difficult day. The assistant must show interest in patients at all social levels.

However, familiarity is a different matter. The assistant should not initiate conversation beyond ordinary greetings and if patients seek to unburden themselves, listen attentively but never probe for further information. Always remember that the assistant is employed in a confidential capacity and any information regarding patients, professional confreres or your employer must be kept in strictest confidence. Avoid familiarity even with any member of your family or personal friends who may be patients.

3. Unfavourable Habits

When on duty you must act in a professional manner and not allow any detrimental habits to destroy your poise and dignity. Habits such as the following are irritating to others and detract from the profession of which you are a part:

- (a) Talking too much.
- (b) Talking to or arguing politics, religion or racial questions with patients.

- (c) Chewing gum.
- (d) Smoking.
- (e) Humming or singing when patient is present.
- (f) Dragging your feet.
- (g) Pencil tapping or biting.
- (h) Nail biting.
- (i) Using the telephone for personal calls.
- (j) Reading magazines, books or papers.
- (k) Daydreaming.
- (l) Being late for work.
- (m) Leaving early.
- (n) Taking extended noon-hours and coffee breaks.

MAKING THE APPOINTMENT

There are many different ways for setting up appointments in offices. Therefore, the assistant should learn the procedure followed in the particular office in which she is employed. Appointment books list months, days, hours and quarter hours.

- They may be on hourly, half or quarter hourly basis.
- Write appointments in the book in pencil.
- Write telephone number beside the name to facilitate calling patients as a reminder.
- If appointments are made when the patient is present, give an appointment card.
- If appointment is made by telephone, send a confirming appointment card by mail.
- Time is frequently reserved during each day for emergency appointments, thus preventing too much overlapping.

(a) New Patients

- May be by telephone or by the patient dropping into the office.
- The assistant must receive the following information:

1. Full Name.
2. Home address and telephone number.
3. Business address and telephone number
4. Whom the appointment is for, self or child.
5. Who referred the patient.
6. The nature of the patient's trouble:
 example: - emergency - degree
 - - duration
 - routine examination

(b) Appointments for Current, Regular Patients

The usual procedure is followed for regular patients except where a shorter or longer appointment may be required.

example: - extensive surgery requires longer appointments.
 - changing packs or dressings requires shorter appointments.

Some patients prefer selected times to accomodate their own schedules:

example: - some prefer early mornings, others late afternoons.

It should be noted that children may be given excusal cards in order that dental treatment can be done during school hours.

Many offices will book a series of appointments to complete a plan of treatment. Others book only one appointment at a time.

(c) Broken Appointments and Cancellations

Wasted or non-productive time becomes a financial loss to the practice. Therefore, it is essential that broken and cancelled appointments be reduced to a minimum. Rules are laid down by the Dentist and must be watched carefully. Many appointment cards carry on the bottom the policy of the office:

example: - Unless 24 hours notice is given of cancellation, a charge will be made.

The assistant will find that many people will be available to fill in where there has been a cancellation. A cancellation list should be kept with telephone numbers so that the day will be completed.

(d) Appointments when the Doctor is away.

It is important that the assistant be on duty when the Doctor is out of town or away through illness. She can then direct emergency calls to another Dentist who has agreed to be on call:

RECEIVING OF PATIENTS AND VISITORS AND DISMISSAL OF PATIENTS

It is in the reception room where the assistant greets, not only patients, but also anyone who may enter the office. Here, the first impression is made

and it is essential that it be a good one. There are many things that go toward making this first impression a lasting one: -

- (a) cleanliness and orderliness
- (b) friendly, courteous and prompt approach
- (c) diplomacy with all types of people
- (d) calling patients by name

1. Receiving New Patients

- (a) Name
- (b) Address-home and business
- (c) Telephone number - home and business
- (d) By Whom referred
- (e) Never enter into discussion with patients regarding:-
 - their dental problems
 - other professional confreres
 - other patients
 - type of service given
 - never criticize another practitioner
 - never make any promises as to what your employer will do
- (f) Make each patient feel that he is of great importance

2. Receiving Regular Patients

The assistant must be just as courteous as she was the first day the patient came into the office.

When regular patients become careless regarding promptness, the assistant must impress the patient with the necessity for being prompt.

3. Receiving Visitors

The assistant should find out the policy of the office regarding visitors. Some Doctors see everyone who calls, whereas others see visitors by appointment only.

Professional confreres and personal friends are usually admitted to the Doctor's private office and the Doctor notified that they are waiting. Dental supply salesmen and manufacturer's representatives who are routine callers may conduct their business with the assistant, or if they wish to see the Doctor, an appointment may be arranged. Always remember that the assistant must be just as courteous to those who call as she is with patients.

4. Dismissal of Patients

Patients must never be made to feel that they are being rushed but if schedules are to be kept the patient should be dismissed as quickly as possible.

- (a) Make appointment for the next visit.
- (b) Give appointment card
- (c) Receive payments
- (d) Give receipts
- (e) If it should be the last of a series of appointments - arrange for a recall appointment.
- (f) Never be abrupt - always be courteous.

PAYMENT PLANS

Business transactions are a serious and vital matter for the patient, for the Dentist, and for the success of the practice. There are several plans possible for the collection of fees and the Doctor must establish the payment plan.

1. Extension of Credit to Patient

- Most offices extend credit to those patients who have been known over a period of years in the practice.
- For these patients estimates may or may not be given.
- Accounts may be sent for the work completed to the end of each month or left until the entire series is finished.
- It is essential that accounts and books be accurate to maintain the goodwill of these patients.
- If errors or supposed errors are brought to your attention you must be courteous and explain to the patient where he is in error and also be ready to admit your own errors and apologize for any inconvenience or embarrassment.

2. Cash Payments

- (a) Even though the office operates on an extension of credit basis, many patients prefer to pay on a "pay-as-you-go" basis. The assistant will present the account for the appointment and the patient pays cash and receives a receipt.
- (b) Some Dentists operate their practices on this basis entirely and in these cases the patients must be informed that they are expected to pay cash for each visit. If it is an extensive procedure, the cash payments may be divided into weekly or monthly payments.

3. Bank Plan

This is permissible in some countries (United States) but in Canada the bank act does not make allowances for such a plan.

4. Canadian Dental Service Plans Incorporated

The Dental Service Plans Incorporated (D. S. P. I.) administers two plans for dental service within the Province of Ontario.

(a) Dental Welfare Plan

Provides dental care for children who qualify under the Mothers' and Dependent Children's Allowances Act of Ontario.

A contract between the Royal College of Dental Surgeons (R. C. D. S.) Board and the Department of Public Welfare of the Province of Ontario has been effected.

The Board receives, each month, a grant from the Department based on an agreed amount for each eligible beneficiary.

There are approximately 20,000 children entitled to this service.

(b) Post Payment Plan

This plan makes it possible for people of modest means to budget for their dental care services as they would budget for any other items which they require for their day to day needs.

These two plans under the D. S. P. I. are administered by the Canadian Dental Service Plans Incorporated and have their offices within the R. C. D. S. Headquarters Building, 230 St. George Street, Toronto, Ontario.

Further information will be found in the bulletins.

PATIENT - RECALL SYSTEM

By means of this system a recall appointment is made at a stated interval of time.

It may be set up as follows:

- (a) On a 3, 6 or 12 months basis
- (b) A list made and the patient phoned for an appointment
- (c) An appointment may be made directly in the book on the last visit and the patient phoned as a reminder a few days before the stated time.
- (d) Recall notices may be sent and the patient is required to phone for an appointment.

This is a very important part of the assistant's work. By means of a well-established recall system the patient receives continuity of service and also the best dental care by realizing the necessity for regular recall appointments.

HOUSEKEEPING DUTIES OF THE ASSISTANT

It has been said many times "If you are not a good housekeeper, you are not a good dental assistant."

Heavy cleaning is usually done by janitorial services but the assistant is responsible for everyday tidiness and cleanliness of the office. She should be particularly watchful of entrance halls, stairways, washrooms and floors and report any neglect of these areas to the Dentist or to the landlord.

It is a good idea to list such things as:

- walls to be washed
- curtains, drapes and rugs to be cleaned.
- equipment to be refinished.

These may be done when the Doctor is away attending a convention or on holidays.

When the Dentist is away, the assistant should utilize this time to do the many jobs that her position demands. Cupboards should be cleaned, unused items destroyed and consumable items itemized and re-ordered where necessary. The amounts ordered are dependent upon cupboard and storage space available.

A clean, tidy, well-aired dental office is an indication of a well-organized, efficient assistant. Such an office is a credit to the profession which she serves and is indicative of the pride she takes in her role in a Health Profession.

As indicated in the lists on pages 22-24 of the text, the duties of a Dental Assistant are many and varied. As you continue with your course it will become evident that this is not "just another job" but a true and enjoyable contribution you can make towards Dental Health.

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GLOSSARY OF TERMS

Reception Room	area where patients, visitors and supply men are received
Operatory	operating room, surgery or treatment room.
Oral Surgery	The specialized branch of dentistry which deals primarily with the removal of teeth, the treatment of jaw fractures, and the surgical correction or treatment of other abnormalities within the jaws and their immediately associated structures.
Orthodontics	the specialized branch of dentistry which deals with the prevention and correction of irregularities of the teeth and malocclusion
Malocclusion	such malposition of the teeth as will interfere with the highest efficiency during the excessive movements of the jaw which are essential to the function of mastication.
Paedodontics	the specialized branch of dentistry which deals with general practice limited to children.
Periodontics	the specialized branch of dentistry which deals with the science and treatment of diseases of the supporting tissues, surrounding the teeth (bone and soft tissue).
Radiography	photography with X-rays.

GLOSSARY OF TERMS

(Continued)

Dental Unit	a piece of equipment (unit) having lines for water, gas, air and electricity, an attached cuspidor (bowl) with running water, light (designed to reflect light into patient's mouth) and a motor with extension arm which the dentist uses for various operative procedures. (Drill).	
Sterilizer	a piece of equipment used to remove or destroy bacteria. May be	
		- autoclave - boiling water - dry air - chemical
Autoclave	apparatus for effecting sterilization by steam under pressure.	
Cast	positive reproduction, in plaster, stone or metal, of an impression.	
Impression	mould from which cast is made.	
Anaesthetic	a drug which produces local or general loss of sensitivity.	
	(a) general -	an agent which produces general anaesthesia either by injection or inhalation.
	(b) local -	a drug which topically (on the tissues) or injection (into the tissues) causes local insesibility to pain.
Auxiliary	supporting, helping or assisting personnel such as:	
		- dental assistant - dental nurse - dental-laboratory technician - dental hygienists - secretary

GLOSSARY OF TERMS

(Continued)

Case History Charts	information obtained from the patient and others regarding the patient's past history which will aid in diagnosis and treatment of dental conditions.
Diagnosis	the art or the act of determining the nature of a disease and also the decision reached.
Examination	inspection or investigation to diagnose a disease.
Practice	the routine application of the principles of Dentistry to the diagnosis and treatment of disease.
Record	an official document for the preservation of information which may be - recorded in writing - photographs - X-ray pictures - study models
Specialist	a practitioner who devotes himself to a special class of disease or to a certain type of therapy.

QUESTIONS AND ANSWERS

1. The Dentist will be out of town for a week's vacation. Describe how you would use this time efficiently.
 - (a) Be on duty to answer the telephone and to refer patients for emergency treatment.

Example: learn the nature of the emergency

- toothache
- broken denture, etc.

telephone the Dentist who has previously agreed to be on call and give him the patient's name, telephone number, address, nature of the emergency and arrange an appointment. Then, either you or his assistant will contact the patient.

This is very important because it makes the patient realize that you and the office in which you are employed are interested in the welfare of your patients.

- (b) Send out drapes, rugs, etc. to be cleaned if necessary.
- (c) Thoroughly clean and tidy the office:
 - (a) drawers and cupboards in Operatory.
 - (b) clean, sharpen and re-sterilize all instruments.
 - (c) storage cupboards -
 - (i) put in clean lining papers
 - (ii) discard items which are not used or old (check with the Dentist before destroying anything)
 - (iii) order new stock
 - (d) polish all operatory equipment.
- (d) Check all filing:
 - charts
 - X-ray pictures
 - accounts.
- (e) Arrange for equipment to be checked by supply house.
 - (i) mechanics
 - (ii) repair and replace frayed cards and hose connections
 - (iii) repair scuffed and chipped areas on equipment.

It will be round that these breaks in general routine when patients are not in the office, will give you much needed time to get caught up to date and organized for the regular daily duties.

2. Initiative is a necessary attribute for any Dental Assistant. Give five reasons for making this statement.

1. Being prepared for emergencies:

- (a) emergency times left free in the appointment book to accomodate patients in trouble.
- (b) emergency list of patients who will come on short notice.
- (c) keeping supplies organized and ordered before the supply of frequently used items is low.

2. Cleaning the reception room and operatory in preparation for the next patient.

3. Answering the telephone courteously and learning how to screen calls in order that the time of the Dentist is not wasted unnecessarily.

4. Learn the day's schedule and be prepared to receive patients at the appointed hour.

5. See that the charts and books are in order so that the monthly accounts can be sent out promptly.

3. Define the following:

- (a) Reception Room
- (b) Paedodontics
- (c) Autoclave
- (d) Auxiliary personnel

(a) Reception Room

it is the area where patients, visitors and supply men are received.

(b) Paedodontics

the specialized branch of Dentistry which deals with general practice limited to children.

(c) Autoclave

an apparatus for effecting sterilization by steam under pressure.

(d) Auxiliary Personnel

supporting, helping or assisting personnel such as dental assistant; dental nurse; dental laboratory technician; dental hygienists; secretary.

1. Answer Promptly
By the second ring. The party calling has no way of knowing if you are busy. The caller is entitled to prompt attention.
2. Identify Yourself
On both incoming and outgoing calls. It may be by giving the name of your dept. or your company, followed by your own name. It might be "Mr. Smith's Office, Miss Doe"
3. Transfer Calls Properly
When calling some firms I've almost got grey hairs through the irritating practice of being unnecessarily transferred from one department to another.

If you can't handle the call yourself, be sure it is transferred to the proper department or office. It means so much to the customer.
4. Keep Pad and Pencil Handy
Pad and pencil goes with the telephone just as cheese goes with apple pie. A great deal of important information comes in by telephone. Write it down. It can save asking unnecessary questions.
5. Leave Message When you Leave Your Telephone
If you must leave the office, let the operator or someone know where you can be reached or when you expect to be back.
6. Place and Receive Your Own Calls
If you're in the habit of having someone else place your calls for you, you're not only wasting time, but you may irritate customers.

On incoming calls answer yourself. You can make friends of customers.

I hear many critical comments from business men about this point.
7. List Frequently Called Numbers
This can save a great deal of time. If possible, keep certain information handy so you won't irritate customers by keeping them waiting while you leave the line.
8. Don't Say "Who's Calling"
You know how irritating that can be. It's just about the same as saying, "If you're important I'll talk to you"
- Inflection of the voice -
We could say "May I tell him who's calling?"

9. If You Leave the Line Explain Why
If you have to do this to get facts and figures, explain to your caller like this, "It will take a little time to get that information, do you wish to wait or shall I call you back?"
10. Indicate You Understand
Acknowledge with some natural expression such as "certainly", "of course" and so on, so that the customer knows you understand. He can't see your facial expression, you know.
11. Terminate Calls Courteously
Verify details where necessary. Acknowledge customer's closing remark. Allow customer to hang up first.
12. Take Required Action
During the call you represent your Company. When the call is concluded you become the customer's representative. It is your responsibility to represent him well and to ensure that he gets service in accordance with the commitment you make to him.

A GOOD VOICE FORMULA

A. D. L. M. T.

- A. Articulation - saying words clearly and distinctly so they can't be mistaken. We all know people who mumble when they talk and they mumble because they fail to articulate properly.
- D. Diction - means choice of words and word combinations to express clearly what we mean. The best aid to good diction is wide reading and observing the way good writers say what they mean.
- L. Level - keeping the voice loud enough to be heard without strain but never so loud that it jars on your listeners or makes a private conversation sound like a broadcast.
- M. Modulation - the quality of voice usage that helps most to make the voice distinctive and give it personality. You can modulate your speech by varying its loudness, by raising or lowering its pitch, by emphasizing words and phrases to bring out their meaning.
- T. Tone - the quality that makes your voice warm and friendly rather than cold and distant.

Being closely associated with the Dental Profession we are bound not only by the code of ethics and morals of the profession but also by certain standards of our own. The Golden Rule should be the guiding principle for the Dental Assistant. We should serve the dentist and the patients who visit the office with honesty, integrity and kindness. Our conduct must be above reproach, for our deportment and personality, both in professional and private life, will be a constant reflection on our position and the profession.

High on the list of necessary qualities for the ideal Dental Assistant are - aptitude and attitude - dignity and tact - loyalty and integrity - poise and graciousness - sympathy, understanding and humaneness - good grooming.

Aptitude and Attitude

Dental Assisting requires ability and intelligence. Our education should be continuous and progressive and our aim, to be consistently proficient in all phases of our work. Attitude is just as important as aptitude. Look on your career with enthusiasm, continually fan your interest by reading the dental periodicals in the office and attend the association lectures and conventions. Enthusiasm creates initiative. Study new ideas to determine whether or not they will be practical then use your initiative wisely to apply them to the office. You will derive a great deal of satisfaction from your contribution to the efficiency of your office.

Dignity and Tact

Dental Assistants have been described as the Dentists' Diplomats. This is the highest peak of attainment we can reach, to feel that through our dignity and tact we have added prestige and refinement to the dental office. Our manner should be friendly yet dignified always remembering we are members of a profession. No matter what our position in life we will constantly be faced with situations which require tact. In our contact with patients knowing what to say and how to say it requires all the natural tact we possess and all we can acquire. In every situation be composed, think before you speak and always be considerate.

Sympathy, Understanding and Humaneness

These are prime assets to the Dental Assistant. Treat each patient with kindness and understanding, whether rich or poor, appreciative, or unappreciative, young or old. There is nothing which will dispel doubts, apprehension and prejudice from a patients mind like a warm smile, a kind tactful word and understanding.

Poise and Graciousness

In the role of receptionist and hostess for the dentist we create the first important impression of the office. Our social graces and personal charm are exemplified in this role. In all our dealings with patients, on the telephone or in the office and with everyone who enters the office we should be courteous, gracious and poised. There are many times when it may be difficult to retain our composure, some days everything may go wrong behind the scenes. Outwardly it should never show when we are upset or something is amiss. When we can walk with poise into a crowded reception room and say to patients who have already waited long after their appointment time that there will be a further delay, when we can still make them feel it is a privilege to wait longer, then, we are Dental Assistants in the truest sense and indispensable to our employer.

Loyalty and Integrity

Our position in the office is one of a confidential secretary along with our many other duties. We are in a position of trust and one of our greatest attributes will be loyalty and integrity in confidential matters. The dentist knows by our ethics and loyalty that we would not betray his confidence nor would we make critical or disparaging remarks about the office or the profession.

Co-Operation

Our first obligation is to our employer, we should be considerate, courteous and co-operative. We know for instance that our hours may not be exactly nine to five or that we will always have exactly one hour for lunch. Our good will and co-operation will contribute immeasurably to the success of the practice and will receive recognition and be appreciated. We can become practice builders through our handling of appointments, our telephone personality and our ability to get along with people.

Good Grooming

We must be at ease with ourselves in order to put others at ease and promote a relaxed harmonious atmosphere. We can only do our best work and be our most poised and gracious when we are sure of our appearance. Knowing we look our best helps to create self-confidence. It is a mistake to assume that patients will not notice the run in our stocking or the soiled uniform. Patients can be acutely critical and their impression of the dentist and the office may well depend on our appearance as well as our attitude when we greet them. It is important therefore to be very particular with our grooming.

Good grooming begins with cleanliness, the daily bath, weekly shampoo, use of deodorants and oral hygiene. It would hardly seem necessary perhaps to mention these basics except that it cannot be overemphasized. When working so close to the dentist and patients we cannot be too particular in this regard.

We should radiate good health, this is the key to an attractive appearance and a glowing complexion. Attention to our diet and adequate rest, the essentials to good health, will give us a feeling of well being both mental and physical and will create a radiant, attractive personality.

Our hands are constantly on display so give lots of attention to their care. Keep nails medium length, it is fine to apply colourless nail polish but absolutely never wear coloured polish.

Hair should be styled a becoming length and should look well when we wear our cap. Once per week shampooing and daily brushing to keep hair clean and shining.

How much make up you wear is a personal matter. A Dental Assistant should apply make up with emphasis on a natural appearance. Not to imply by this that we should look plain or dowdy, quite the contrary. However we should save the glamorous eye make up for evening wear.

You cannot look your best and most attractive if you are rushed. Give yourself time in the morning to go over the details of your uniform - buttons in uniform - shoes and laces clean - run free white hose - time to comb your hair once more, put on your cap and forget it for the rest of the morning. Now with the reception room and operating room in order, we are relaxed and composed ready to greet the first patient immediately on arrival.

THE "SHOULD NOTS" FOR THE DENTAL ASSISTANT WHO WOULD SUCCEED

1. Should not stay in a dental office unless she enjoys her work.
2. Should not save her good manners for out of the office.
3. Should not gossip about office or patients' affairs.
4. Should not talk to patients of irrelevant things that do not pertain to dental health and appearance.
5. Should not use loud conversation on the telephone or in the office at any time.
6. Should not receive unnecessary personal telephone calls during office hours.
7. Should not make up complexion or re-arrange hair in patients' presence.
8. Should not use slang or chew gum in a dental office.

9. Should not talk unnecessarily or argue with the doctor in patient's presence.
10. Should not minimize patients' needs to them.
11. Should not in any way attract the doctor's attention from the patient on whom he is operating.
12. Should not press conversation if patient is type who refrains from talking.
13. Should not quote fees over the telephone.
14. Should not appear untidy at any time.

AN EFFICIENT DENTAL ASSISTANT

1. Should arrive at least one half hour before the doctor.
2. Should ventilate each room and see to it that all is in order.
3. Should acknowledge patient's arrival promptly.
4. Should have complete data on every patient before positioning him in operating chair.
5. Should give patient true idea of how long he will have to wait for the doctor.
6. Should prepare patient for doctor - mentally as well as otherwise - having every detail in readiness before the doctor enters operatory.
7. Should take every opportunity to observe skill and value of dentistry.
8. Should record every service the dentist renders.
9. Should answer the telephone pleasantly giving the doctor's name.
10. Should keep the doctor's credit above reproach.
11. Should keep her character and appearance above reproach.
12. Should be an active member of her association.
13. Should concentrate on her profession while in the office.

Dental Assisting is a demanding job - never to act on impulse and to remain poised and retain a sense of humour through all situations requires self discipline. Yet few occupations offer more opportunities to exercise good judgment and individuality and is more rewarding than Dental Assisting.

Through the development of these qualities we have outlined and the perfection of our human relations, we will have the satisfaction of knowing that in these often hectic times, we have been of very real service to others.

INTRODUCTION

This lecture will deal with the subject of terminology - that is it will deal with the terms and names used in the practice of Dentistry.

One of the most important phases of all human relationships, in business and professional careers, is the ability to express oneself clearly and concisely.

In a profession such as yours it is necessary to use scientific terms. If they are used incorrectly confusion and misunderstanding are certain to occur. This does not mean, however, that you must talk with an attitude that will cause others to gain the impression that you know more than they.

You have probably heard some people talk about uncommon diseases they have had, and use medical terms and roll them around their mouths with great satisfaction because it is a new word to them and they know full well that few other people are familiar with it. It gives them a feeling of superiority. It simply means that you should use the correct term to express yourself clearly.

One of the first things I would like to mention is that of the names of the various professions. It is commonplace to hear the phrase "Doctors and Dentists". I have heard that phrase many times and seen it in print. It bothers me. Dentists are doctors too and if we are to uphold our prestige we should not permit any disparagement to appear in our conversation. The term should be physicians, and dentists, physicians and pharmacists or physicians and osteopaths, etc., but always refer to a professional man by his correct title.

A Dentist is really a specialist in the healing arts. Few professions have as much training in a particular part of the body as a dentist. He is given the legal right to treat the teeth, their supporting structure which is the bone and soft tissues of the mouth, or the oral cavity, and in this field more people have disease than anywhere else in the body and the dentist is the highest authority.

While this is a small part of the body, it is so complex and the diseases that affect it, and the techniques that are required to treat all phases are so diverse and precise that few can be imminently successful in all. Consequently there are several specialties within the profession of Dentistry.

A General Practitioner is trained to make a good diagnosis and devise a plan of treatment. He should know about all the phases of dental practice such as extracting teeth, restoring carious teeth to their normal function, treating periodontal disease, restoring lost teeth, treating roots, imparting

the knowledge to his patient as to how they may prevent dental disease, and doing all these things for all ages. He will, however, come upon many cases that present extreme difficulties, that call for special knowledge and skill. These he will refer to a specialist who has that knowledge and skill in the particular field.

For example: a cleft palate. These are not so common that every dentist can hope to become proficient in the successful treatment of cases such as these. Or in certain types of surgery - impacted teeth.

Then few dentists are versatile enough that they can be extra good at every phase of practice. So, as I said, they refer those patients to someone whom they are convinced can give the patient the best service available.

2. To an oral surgeon who restricts his practice to this particular phase of dentistry and who has developed skills and has the instrumentarium and equipment - and the ASSISTANT to enable him to perform surgical operative procedures.
3. To an Orthodontist who has received special training (post graduate) to successfully treat cases of irregularity in the teeth and jaws - for purposes of efficient function and also aesthetics.
4. To a Periodontist who deals with the prevention and treatment of the hard and soft tissues surrounding the teeth.
5. To a Prosthodontist who replaces lost or absent teeth and tissue with an artificial substitute.
6. To an Endodontist who treats diseased roots in order to prevent the loss of teeth.
7. To a Paedodontist who restricts his practice to children.
8. Dental Public Health Officer who deals with Public Health problems as they relate to preventive dentistry, through education and treatment of those who may not be able to avail themselves of the services of a private practitioner, on a community level.

In Canada the Royal Canadian Dental Corps serves all the Armed Forces, The chief of the R. C. D. C. is a Brigadier and his Corps serves the Army, Navy and Air Force and the standard of service is very high.

The Federal Department of Health and Welfare have a staff of administrative dentists who deal with dental problems in their department. Each province also has a Director of Dental Services who administers dental affairs

within the jurisdiction of the province, i. e. provincial hospitals, penal institutions, etc.

Auxiliary Personnel

In these days of busy practice auxiliary personnel have become more important than ever. The dentist relies upon assistance from several quarters.

1. His office assistant which is you, is his right hand.
2. His laboratory technician, who performs the technical operations chiefly in prothodontics. He finishes artificial dentures, cast partial dentures, fixed bridges, porcelain jacket crowns, etc. In some offices the assistant will be required to do some of these technical procedures, such as investing and casting inlays, pouring impressions for models, etc.
3. The Dental Hygienist is a relatively new addition to auxiliary personnel. She is trained to do certain operations in the mouth, such as scaling teeth and performing prophylaxis, which means prevention, making X-ray exposures and teaching techniques in prevention. These are time-consuming procedures and the dentist can often ill afford the time required.

I mentioned the word prophylaxis just now, this word means prevention - most people use the term cleaning teeth - a term which I abhor. When I do a prophylactic treatment for a new patient I call it a preventive treatment. I make sure that they do not think of it as having their teeth cleaned. Rather it is conditioning their teeth and gingival tissues so that their proper home care will have the maximum effect, I would exhort you to do your level best to take the phrase "cleaning teeth" out of dentistry.

DISEASES OF THE ORAL CAVITY

Dentistry is concerned only with the tissues of the mouth, but we must think of the mouth not as something apart, but as a part of the body. Everything that enters the body passes through the mouth or nose and if these parts are diseased then complications are sure to follow.

Dental caries is one of the most common of all diseases to afflict civilized man. It is so universal that many people have adopted an attitude of acceptance. They just expect caries and believe that the best thing to do is regular dental care. This is good practice but one of the chief responsibilities of a dentist is to teach how this disease may be controlled or prevented. - Describe how cavities develop, etc.

The mouth has frequently been described as the barometer of the body. Many diseases that affect other parts of the body can be recognized early by certain changes in the oral tissues. Remember the family physician asking you to stick out your tongue? Scarlet fever is a good example of this type of diagnosis.

Oral cancer seems to be more common or it may be that we now recognize early symptoms and if it is to be treated successfully it must be recognized early.

These are some of the important functions of dental practice.

BASIC AND GENERAL SCIENCES RELATED TO DENTISTRY

There are few courses at the University that have as broad an application as the course in dentistry.

1. Anatomy - is the study of the structure of the body and the relationship of its parts. This is divided into several sections:
 - (a) Gross anatomy - dissection of the whole body using cadavers.
 - (b) Comparative study using other members of the animal kingdom.
 - (c) Embryology - study of how the body grows from conception to birth.
 - (d) Dental anatomy and dental embryology is concerned with dental structure and forms.
 - (e) Histology is the microscopic study of the body tissues in their state of health so that we are able to recognize a variation when disease is present.
2. General Pathology - is a study of diseases as they affect the entire body. Oral Pathology is concerned with disease processes of the oral cavity both macrology and micrology.
3. Bacteriology - is the study of minute single cell organisms. The only way that these organisms can be seen is by means of a microscope. Not all micro organisms or bacteria produce disease. Many are beneficial and some types helpkeep harmful types under control.

The disease producing types are known as pathogenic bacteria.

4. Chemistry - This science deals with matter in all its form. General Chemistry is divided into inorganic and organic and analytical chemistry.

Bio-chemistry is the study of the chemistry of the body - for example - the changes that take place in food from the time it is taken into the mouth until it is utilized by the living tissues. This process is metabolism.

5. Physiology is the study of the function of the body. Dealing with the purposes and functions of the various parts of the body, i. e., muscle action, heart action, etc.
6. Pharmacology - is the study of the nature and properties and actions of drugs. Materia medica deals with the sources and make up of drugs.

There are many drugs used in dentistry from simple sedatives to potent narcotics and antibiotics such as penicillin.

It requires a good deal of study to keep up with this science because new drugs are developed constantly.

SCIENCES AND STUDIES IN THE FIELD OF DENTISTRY

There are certain terms that we use commonly in dentistry that have taken on a special connotation i. e., operative dentistry. This term usually means that the art of preserving diseased, defective or malformed natural teeth by means of various types of restorations, such as gold inlays, porcelain and gold crowns or by using silver amalgam or synthetic porcelain. Often these restorations are called fillings and this is the term most laymen use. It is another word that I think should be taken out of dental terminology. Often diagnosis and prevention in root canal therapy or endodontics, is included in the term operative dentistry and this is usually true as it concerns general practitioners.

Prostheses is the art of restoring lost parts of the body with artificial substitutes - a foot, a leg or arm or eye that is lost is restored by prosthesis.

Dental prosthesis is merely referring to the restoration of lost teeth or jaws or any part of the oral cavity. This is most commonly accomplished by means of complete dentures if all teeth are lost, or removable partial dentures if some natural teeth remain, or fixed bridges - a restoration that is cemented into place.

Sometimes it is difficult to differentiate between dental or facial prosthesis, and plastic surgery - these days automobile accident cases are becoming more and more frequent and dentists and surgeons frequently must collaborate.

Anaesthesiology - is the study of the agents and methods that produce insensibility to pain. These can be divided into two categories:

1. General anaesthesia - where the patient becomes unconscious. There are several means of accomplishing general anaesthesia - inhalants such as nitrous oxide and ether and others where the drug is injected intravenously such as sodium pentothal.

2. Local Anaesthesia

- (a) Infiltration where novacaine or procaine is injected close to the site of operation.
- (b) Conduction or block anaesthesia where the drug is injected close to a main nerve and the whole area served by that particular nerve is anaesthetized.
- (c) Topical anaesthesia where the drug is applied to the surface tissue - this is commonly used by oculists.

Roentgen rays - is the study of the action and effects of X-rays on the body. It is used in dentistry chiefly for diagnosis but in medicine it is used also as a type of therapy. The word Roentgen is the name of the scientist who discovered the action, and X-rays is now used because the other is difficult to pronounce and also because when the rays were first discovered they were not fully understood and hence X the unknown quantity.

Oral Surgery - We spoke of this term earlier but it should be differentiated from the practice of removing teeth which is known as exodontics. Oral surgery encompasses the removal of teeth but is a much wider field.

Periodontology - The same thing applies to this term as to oral surgery. Periodontology is the study of the supporting structures around the teeth and a periodontist is one who practises this art. It is however, much more comprehensive than scaling teeth - which is sometimes done by a hygienist.

Paedodontics - Limited to children - similar to paediatrician in medicine.

Orthodontics - We discussed this previously. An orthodontist usually treats the difficult cases of irregularity or malformation. However, general practitioners should treat cases from the preventative aspect, such as holding space when a deciduous tooth has been lost prematurely. Many orthodontic cases, however, require long periods of treatment - sometimes years, and these should be in the hands of an orthodontist.

Diagnosis - One of the first things to do when a patient presents himself for treatment is to determine the nature of the difficulty. The need for treatment and the possibility of treatment - except in emergencies - this is the usual procedure. Your part in the phase of diagnosis would probably be to chart the information as the dentist calls it out and you would, of course, need to know the terms he uses.

COLLOQUIAL TERMS

The term colloquial means informal speech or it sometimes means terms used in certain localities. It is said that in England it is possible to determine where a person was raised within very narrow limits simply by his speech.

In dentistry there are many terms used to designate various diseases or organs that are unscientific to say the least. Some have been in use for so long that they are accepted by the general public and any other name would not be understood, i. e. gums for gingival tissue.

There are some, however, that should be taken out of our vocabulary and supplanted by terms or names that are much more descriptive and accurate as I mentioned earlier, Doctors and Dentists should be physicians and dentists; cleaning teeth - preventive treatment or prophylaxis. These are much more accurate in describing what we mean.

Temporary, baby, first or milk teeth should be known as primary teeth or deciduous teeth. Some like the term foundation teeth but that is not very scientific. The other terms, however, tend to create the impression that these teeth are unimportant because they will be followed by others. When in reality they are extremely important and some of them must remain in place until eleven or twelve years of age.

Eye tooth or dog tooth	-	upper cuspid
milk tooth	-	lower cuspid
6 year molar	-	1st permanent molar
12 year molar	-	2nd permanent molar
wisdom tooth	-	3rd permanent molar
pyorrhea	-	periodontal disease
Proud flesh	-	granulation tissue
Dental Plate	-	Artificial denture
Filling	-	Dental restoration
Gum boil	-	abscess
Freezing	-	for local anaesthetic
Canker or fever blister	-	for stomatitis
Trench mouth	-	for Vincent's disease or ulcerative gingivitis
Pulling teeth	-	for extractions

It is much more accurate to use the correct term in discussing dental conditions. You will have many opportunities to teach the general public in this particular matter.

Every business must keep records. These are required by law and without them a business could not operate very long. In dentistry there is an additional moral obligation to the patient to keep accurate records.

Professional records consist of all the information and material which may be gathered from various sources concerning the patient. These are usually written in ink, on special cards and must be kept neat, accurate, concise and readily accessible.

A. IMPORTANCE OF PROFESSIONAL RECORDS

I. To the Dentist

1. Patient's complaint must be known before it can be treated.
2. Medical and dental histories may have a bearing on the condition and treatment.
3. Results of visual examination of the mouth must be recorded before a diagnosis and plan of treatment can be made.
4. Treatment must be recorded to show whether it is progressing satisfactorily.
5. Often additional information in the form of X-rays, study models, consultation etc. is required which is not available at the time of examination, this can be later co-related to the original written record.
6. The results of diagnostic aids must be recorded.
7. Patient may require several visits. It is essential to know what work has been completed and what further treatment is required.
8. When consultation with another doctor is required, records supply the necessary information.
9. A record of the treatment required is necessary to determine the fee.
10. Written records help to clear misunderstandings. In case of legal action such records are imperative.

II. To the Patient

1. Every patient is entitled to adequate examination which should be recorded for future reference.
2. Patient should be told of the treatment required, how long it will take and the fee.
3. Study of the complete record may disclose conditions unknown to the patient which require treatment.
4. What treatment was given may be valuable information in the future should the condition re-occur.

III. To the Profession

1. Unusual cases may be important for research or teaching purposes.

2. Records are invaluable sources of material for clinics and lectures.
3. In some cases, personal identification by means of dental records may be necessary.

B. SELECTION OF RECORD SYSTEM

- A system is selected by the doctor when he first starts to practise.
- It may be desirable to change the system later.
- Many doctors develop their own systems.
- Complete systems, of varying complexity, are available. Bosworth, Cameron, Postrite etc.

C. APPOINTMENT BOOK

- Many types of books available.
- The open book should lie flat and show the six day week.
- Generous space for FULL NAME and telephone number
- Room for type of appointment, short, long extra long - or the work to be done.
- Use PENCIL, changes can be made neatly.
- Have CANCELLATION LIST, patients who can accept appointments on short notice.
- New books are obtainable in July to permit entering "six month recalls."
- In new book immediately note the following:
 - all legal holidays.
 - day of the week when doctor is not available.
 - dates of annual conventions and vacation.
 - buffer periods in day or week, if doctor uses them.
 - Important telephone numbers, police, fire dept. confreres, etc.

D. APPOINTMENT CARD

- Printed card giving doctor's name, address and telephone.
- States the penalty, if any, for broken appointments.
- Gives date and time of patient's next visit.
- May be sent as confirmation of appointment given over the telephone.
- A REMINDER, saves broken appointments.

E. PATIENT FOLDER

- May or may not be used.
- Would contain everything pertaining to each patient or family. charts, X-rays, duplicate receipts, correspondence etc.
- File folders or large manilla envelopes.

F. CASE HISTORY

- Usually combined with the chart, could be a separate card.
- May be a few simple questions or an elaborate questionnaire.
- The dental assistant completes as much of the case history as possible.

Note:

- Name in full, spelled correctly, with correct pronunciation.
- Mrs. Mary Doe, not Mrs. John Doe.
- Marital status, Mr., Mrs., Miss or widow.
- Husband's, or in case of child, father's first name.
- Complete address and telephone number. (Address with postal zone)
- Business address and telephone number.
 - if no answer at home, can leave message at office.
 - may help in collecting delinquent accounts.
- Date of birth.
- Referred by? Name of family physician.
- past medical and dental history, allergies, diseases, etc.
- Patient's present complaint.
 - emergency treatment or full examination.

CHARTS

- Many types, may be a standard card or designed by the doctor.
- Often combined with case history.

- CHARTING

- is the process of recording the information obtained during the examination of the patient.
- Should be written in ink as this record may be required in a court of law.
- Various SYMBOLS and colors may be used, some are standard and others devised by the doctor.

- If no separate case history card is used, then all information regarding name, address etc. is filled on this chart.
- One method of designating each tooth in the jaws is:

Upper right permanent teeth.

8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

Upper left permanent teeth.

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

Lower right permanent teeth

8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

Lower left permanent teeth.

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

Upper right deciduous teeth.

e | d | c | b | a |

Upper left deciduous teeth

a | b | c | d | e |

Lower right deciduous teeth

e | d | c | b | a |

Lower left deciduous teeth.

a | b | c | d | e |

- A Missing tooth is shown by a box ☐
- Each tooth surface has a specific name:

Mesial	all teeth	surface closest to mid line	M
Distal	all teeth	surface farthest from mid line	D
Lingual	all teeth	tongue side	L
Buccal	posterior teeth	cheek side	B
Labial	12 front teeth (top & bottom)	lip side	La
Occlusal	posterior teeth	biting surface	O
Incisal	12 front teeth	biting edge	I

- The distal of one tooth, normally touches the mesial of the tooth behind, Except for the two central incisor teeth, where the mesial of one touches the mesial of the other.
- The location of cavities, restorations etc. is shown by the above symbol
 - An MOD cavity would be one that extended from the front of a posterior tooth across the biting surface to the back.
 - An OD restoration would involve the biting surface and the back of a posterior tooth.

H. ADDITIONAL RECORDS

These can be very important for proper diagnosis and treatment planning.

1. Vitality Tests: Of various types and determine the degree and kind of response to various stimuli, thereby indicating the state of health of the tooth.

Percussion	-	Tapping tooth with metal instrument.	Per. + or -
Pressure	-	Biting on hard object.	Pre. + or -
Heat	-	Hot drink or warm gutta percha.	H + or -
Cold	-	Cold drink, ice or ethyl chloride.	C + or -
Electrical	-	Vitalometer, a slight electrical shock sent through the tooth.	sliding numbered scale 1 to 14.

2. X-Ray film: Special pictures which reveal the interior of the tooth and the supporting bone. This Topic will be covered fully at subsequent lectures.
3. Study Models: Exact reproductions in plaster or stone of dental arches.

- Show the patient the condition of his own teeth,
- Visual aids in showing how certain untreated conditions may progress in the future.
- Before and after records of treatment, e.g. orthodontics.
- For treatment planning in prosthetics, e.g. dentures, bridges.
- Give exact size and shape of existing teeth.
- For consultation when it is not necessary to refer patient to another doctor.

4. Photographs: Transparent coloured slides are becoming increasingly useful in the dental office.

- Before and after records of treatment.
- Visual aids in showing patient what can be done.
- how finished restoration will look.
- For research, teaching, clinics and lectures.

ESTIMATES AND CONTRACTS

- Patient is entitled to know the fee before treatment is started.
- Patient should be told the office policy of how fees are to be paid.
- Customary to quote a total fee for all the service, rather than a fee per item.
- May be necessary to quote several fees for alternate treatment plans.
- The fee quoted must be written on the chart to prevent misunderstanding.
- Patient must agree to the fee and method of payment.
 - May be a simple implied obligation to pay.
 - Verbal understanding between doctor and patient.
 - Notation on chart by the doctor on method of payment.
 - this may be signed by the patient.
 - Post dated cheques issued by the patient.
 - Formal contract signed by the patient.
 - promisory notes.
 - D. S. P. I. contract.

Very few years ago the physician, the dentist, the candlestick maker, simply estimated the amount of money left over after all bills were paid and judged the success of their efforts thereby. That was before the advent of the Income Tax, Unemployment Insurance, Hospital Plans and payroll deductions. In those days income tax considerations were negligible, many patients paid their bills in produce or service, living expenses were low, no assistants were employed, and there was no such thing as depreciation of equipment. Now we must not only keep records but we must be able to account for all transactions of previous years.

The degree of bookkeeping responsibility to be assumed by a Dental Assistant depends a great deal on the personality of her employer. Some dentists find that working with figures is a welcome relief from the usual daily chores; others have simply no inclination to concern themselves with accounting records. As a personal opinion I might add that it appears to me to be a great waste of a valuable health service for a dentist to spend any more time than absolutely necessary in the checking of records.

In either event, a trained dental assistant must understand basic details so that she can assume full responsibility for management if she is called on to do so. In addition to the other things which you have learned you must understand the basic principles of accounting in order that you may lend yourself to, and possibly improve the system which your dentist has in operation.

You must understand the accounting for receipts and expenses, how to make proper payroll deductions, how to bank, and how to prove your calculations by balancing.

PRINCIPLES OF BOOKKEEPING

The goal of any accounting system is to give an accurate reflection of the monies received and spent during any given period. The dictionary has this to say - "a reckoning of debit and credit in money or service; a statement of money received and expended, with balance". I like the latter - "a statement of money received and expended WITH BALANCE". It covers the whole field in very few words.

Bookkeeping can most easily be visualized if we compare it to the oldfashioned scale of the type which dispenses Justice - a balance where, when we place a penny on one side we must place a penny, or something to equal that on the other side to bring it back in balance.

all but the largest dental offices, it is general practice to keep books on a 'cash' basis. Cash basis bookkeeping is largely a matter of common sense.

First - what is our goal in keeping books - what are we trying to accomplish?

- (1) To inform the dentist, our employer.
- (2) To prove to ourselves that this information is accurate.
- (3) To inform others such as Governmental agencies, etc.

Our paramount duty is to inform your employer. The divulging of such information to others can only be done on his instructions.

What information does the dentist want? Basically it amounts to this -

- (a) How much money did I receive?
- (b) How much did I spend?
- (c) How much have I left?

Every bit of information is only an elaboration on these points. So our final summary must show the gross receipts, minus the cost of doing business, equals the net professional earning. Before going into detail, there are several cardinal rules to efficient bookkeeping which cannot be flouted with impunity, namely:

PROMPTNESS OF ENTRY

A bookkeeping system affords a place for each notation. ENTRIES SHOULD NEVER BE POSTPONED at the risk of being overlooked or forgotten. I cannot stress this too strongly - never postpone making the right entry in the right book for any reason. If you accept cash from a patient, make out the receipt NOW. If you write a cheque or pay out cash, enter it in the ledger NOW.

CONSISTENCY OF ENTRY

It is not important if you classify the repair of a chair for instance as office upkeep or as repairs. What is important is that you are consistent in your thinking so that your summary at the end of the month and the end of the year has actual meaning.

DEPOSIT ALL RECEIPTS INTACT IN AN OFFICE ACCOUNT IN THE BANK

It is not always easy to persuade a busy dentist of the necessity of depositing all receipts, for it is easier to use currency received than it is to cash a cheque. However, he may always cash his own cheque from the deposit box or drawer. ONLY IF THE RECEIPTS AGREE TO THE PENNY

WITH THE DEPOSITS SHOWN BY THE BANK STATEMENTS are the records audit proof. What do I mean by audit proof? I mean that we have corroboration by an independent source, in this case the bank, of the accuracy of our figures. Anyone who realizes this major implication of being AUDIT PROOF will adopt it immediately regardless of personal feelings.

4. PAY ALL EXPENSES BY CHEQUE

Minor ones may be paid by using the petty cash system which we will explain later.

5. FILE INVOICES SYSTEMATICALLY

I suggest they be filed in the same order in which the cheques are written for ready reference.

THE SYSTEM

With these principles firmly embedded in our mind, let us go back to our original goal - what do we have to produce -

"a statement of money received and expended, with balance".

To accomplish this purpose it is obvious that we should have three books, or ledgers; one to account for all monies received, one to account for all monies expended, and one where we can bring these two into balance with our cash in the bank.

In most offices the receipt book, in duplicate, is the book of original entry for all monies received. When you receive money for any purpose you IMMEDIATELY sit down and write out a receipt. Now, you can attend to other details if you so wish - you have it written down in the proper place - a place where it cannot be lost or forgotten.

In addition to this receipt book we should have a book where we can summarize the daily receipts. So we open up a ledger for receipts and disbursements. At the end of the day we add up the total of the monies shown in the receipt book, count our cash, make up a bank deposit for the morning and enter these totals in our ledger.

What have we accomplished so far? - we have given everyone a receipt - we have totalled our receipts and found that this total agreed with the cash we have in our possession - we have put that exact amount of money in the bank. So we have proven that our cash is correctly accounted for and we have ensured that the bank will act as our auditor if necessary. Because today was exact, and because every subsequent day will be exact, we know that we can balance each month, and each year, to the penny.

Now we will turn to the next phase - the paying out of money. Here again we must have a book of original entry. However, because cheques are not normally made out in duplicate we must establish some other record as the book of original entry. In most cases this is called a "cheque register" a "disbursement", or an "expenditure" ledger. Sometimes it can be done by using the cheque stub although this is not desirable as there is no chance of placing our figures in columns for easy addition. Here again let us be consistent and let us be prompt. ALWAYS MAKE THE ENTRY IN THE LEDGER BEFORE YOU WRITE THE CHEQUE.

A little earlier on I made the statement - pay all expenses by cheque. This invariably brings up the question - I cannot pay my laundry, my postage, and the other daily items by cheque or I would do nothing except write cheques.

The answer is simple - but so important - have and operate a petty cash fund on what is called an imprest system.

The first thing to do is to decide how large this should be. If you would expect to pay out \$15.00 to \$20.00 per week in small items have the dentist LOAN you \$25.00. This is not an expense, just a loan. Put it in a separate box from your other monies - call it your Petty Cash Box. It now contains \$25.00 which you owe the dentist and are responsible for. As the laundry man comes in you pay him \$1.80 from this box and put the laundry slip in. Next you buy stamps and you put in another chit then maybe some Kleenex, etc. So that, at the end of the week (or at any time) you have the equivalent of \$25.00 in that box in either cash or slips.

Let us say that by the weekend you have spent \$22.50 from this box and have \$2.50 left - what do you do? Sit down and write yourself a cheque for \$22.50, cash the cheque and you still have your original \$25.00.

The \$22.50 which you spent has been paid by cheque and will reflect in both your records and the bank so that once more we have proof. Your slips are filed with other invoices.

The petty cash system is simple to operate and will save any dental office hours of time and effort in trying to maintain a list of small expenditures.

At the end of the month we summarize our expenditures and enter this into our Statement of Receipts and Disbursements.

We now have all our money received and entered in this book and all that we have spent so it is possible with this information to arrive at a balance.

We have now covered the basic requirements of accounting for the financial details. This is only a portion of our job - you have to be familiar with the deductions to be made from your salary for Income Tax and Unemployment Insurance; the proper filing of statements and invoices; banking regulations;

the preparation of statement and collection letters; as well as the submitting of accounts for the various welfare organizations which exist to provide dental care for certain groups.

In regard to deductions I cannot improve on the material which each Government Department provides free of charge. This is available on request and may change from year to year. If you are in doubt either phone or write to the applicable Department and ask for instruction. It is their job to provide such information so you should not feel hesitant in asking.

Your filing system is very important. I strongly suggest that you file all paid invoices on a file in exactly the same order in which you wrote the cheques. This is important for both internal office procedures and external reasons. It is easier for you to review your work in case of errors or for informational reasons and it is infinitely preferable from the standpoint of accounting to the Income Tax Department when you can hand their auditor your receipt books, your cancelled cheques, and your paid invoices all filed chronologically. They can then work from item to item, proving as they go, so that there is no question or doubt in their mind as to the accuracy of your work.

COLLECTIONS

The collection of unpaid accounts is one of your most important duties.

Because opinion varies so widely in this field and because this procedure must be linked up so closely to the temperament and the wishes of the dentist you serve, I am not going to lay down any set procedure in this regard. There is, however, one set rule to follow - give the patient every incentive to pay as much and as soon as he or she possibly can.

In this you must act with the knowledge that your dentist has performed a valuable health service and that HE IS ENTITLED TO BE PAID. By your actions you must impress the patient with this knowledge. You are doing both the dentist and the patient a service by adopting a firm attitude.

You have learned about the value of estimates and contracts. It is up to you to assist the patient in interpreting this into terms of payment. Never let a patient leave the office without either paying cash for the treatment provided or else making a firm commitment about the payment of the balance owing.

You must remember that the payment for dental services is competing with all the credit buying and easy payment plans in existence. And the professional man is the one who, once his service is rendered, has no product to repossess and no force to exercise except the final one of court action which is always undesirable.

So you must, by your manner and your attitude, always impress the patient with the idea of paying. When, with your dentist's approval, a patient does leave without paying your follow-up should be made systematically. Never allow an account to become over a month old before you have sent the patient his first statement. From my own experience I can say that there is nothing more aggravating than to receive a bill for something which I have forgotten because someone forgot to remind me. Even those who fully intend to pay resent this.

So, with your dentist, establish a pattern and stick to it religiously. I would strongly suggest that you take advantage of the facilities offered by D. S. P. I. in their post payment Plan. D. S. P. I. has been established by the profession for just this purpose - to provide accounting facilities and advice for dentistry - use it wisely in order that it might serve you.

DENTAL WELFARE PLANS

In this field there are such a variety of services paid for through local, municipal, provincial and federal welfare agencies that it is impossible to cover them all. As they arise it is always possible to contact the particular agency and ask for their instructions.

The only plan which is operated consistently on a province wide basis is the one operated by the R. C. D. S. and I am supplying you with our bulletin covering its operation.

FINALE

I would strongly suggest that you study whatever informational material you receive - not the purely technical, operative portion - but the articles and the plans so that you may become familiar with the ideals of your dentist.

I might as well tell you that I expect you to be his eyes and his ears. Most dentists are too engrossed in their daily work to study changes that are taking place. You must be his storehouse of knowledge in all matters pertaining to the business side of his operation.

I would also strongly suggest that, once you are established in a dental office, you immediately contact the Dental Nurses and Assistants Association in your region. This as the name implies, is your organization and, through them, you can increase your knowledge of your work as well as forming lasting friendships.

DENTAL, OFFICE, and MISCELLANEOUS SUPPLIES

- (a) DENTAL SUPPLIES are those materials and items used in operative or laboratory procedures. They may be expendable or nonexpendable.
 - (1) Expendable supplies are items which are expended or used up. (i. e. cements, silicates, X-ray film, waxes, drugs, etc.)
 - (2) Nonexpendable supplies are items which are not expended or used up within a reasonable length of time. (i. e. cutting instruments, handpieces, film racks, plaster bowls, etc.) These should not be confused with major equipment, which is not classified as supplies, but as dental equipment.
- (b) OFFICE SUPPLIES are those items which are used for the development and maintenance of proper records and correspondence. (i. e. record and examination forms, statements, receipts, appointment books, appointment cards, stationery, pencils, pens, etc.)
- (c) MISCELLANEOUS SUPPLIES are items which are not included in Dental Supplies or Office Supplies, (i. e. towels, uniforms, gowns, soap, handbrushes, furniture polish, magazines for the reception room).

MANAGEMENT and RESPONSIBILITY FOR SUPPLIES

GOOD SUPPLY MANAGEMENT on the part of the dental assistant is essential to any dental office. Without it hours of valuable time may be lost, and the dentist and the office cannot function efficiently. Responsibility for supplies is usually delegated to the dental assistant. It is the dentist who initially determines (a) the exact type or kind of supplies to be used and stocked and (b) the maintenance level of all supplies which are to be used. But it is the dental assistant who is usually responsible for supply maintenance, including a periodic inventory, and the ordering receiving, storage, and distribution of all supplies within the dental office.

She must be able to identify all items of supply used in the office, and also be able to associate the use of a particular item with a procedure or operation. The dental assistant can gain such information from:

- (a) her employer
- (b) a study of the illustrations and comments in the packages containing the supplies.
- (c) catalogues of the dental supply companies.
- (d) attendance at conventions and meetings of the dental assistants.
- (e) study courses offered assistants through various dental associations.

SOURCE OF SUPPLIES

- (a) Dental Supply Companies carry the majority of the items classified as dental supplies, and some items classified as office supplies. (i. e. appointment books, records and examination charts and forms) There are usually one or more dental supply houses located in large centres, most of which have salesmen who visit dental offices periodically.
- (b) Pharmacies and Drugstores - carry drugs and medicines, and sometimes miscellaneous items (soap, white shoe polish, pencils, pens)
- (c) Stationery Shops, Book Stores, and Printing Companies supply various office supplies.
- (d) Medical Supply Companies may provide items of medicine and surgical supplies not stocked by dental supply companies or drugstores.

ORDERING AND RECEIVING SUPPLIES

Supply Needs: Before supplies can be ordered, it is necessary to ascertain the need. A list citing the minimum and maximum amount of supplies to be retained on hand is prepared, and the assistant checks the supply of these items at regular intervals. Items found short should be listed on a Want List and an order placed for them. After delivery their entry is removed from the want list.

ORDERING: Supply companies will arrange that their representatives visit individual offices at regular intervals, and will furnish each office with order blanks, envelopes, and rush order cards. In large centres where supply houses are close at hand, the order may be taken from the want list and placed with the salesman when he calls, or telephoned direct to the supply house. For rush items, use the telephone and request that the item be rushed to the office. If in a smaller community, mail your order form to the supply house, and if the need is urgent send a rush order card which will receive the priority in filling. Salesmen service these areas regularly too, and your order may be placed at the time of his call. Good supply management should decrease rush orders to the minimum. It is advisable that a copy of each order be made for use in checking when goods are received.

DELIVERY: In larger centre items ordered are usually delivered by messenger. In smaller communities supplies are usually shipped by parcel post. In the case of shipments of heavy materials, such as plaster and stone, express or freight may be the most economical method of transportation. In most instances, supplies are sent prepaid and shipping costs are added to the invoice.

RECEIVING SUPPLIES: An invoice is usually placed in the package with goods delivered, but is sometimes mailed separately. An invoice lists goods sent to a purchaser and shows prices, amounts, and shipping charges. When supplies are received and unpacked, they should be checked against the invoice. If the invoice has not arrived when the items are delivered, a list should be made and checked against the invoice later. All items received should be scratched from the want list. The copy of the order is then clipped to the invoice and they are placed in a monthly file under the name of the particular supply company. After the supplies are unpacked and checked, they are placed in their proper storage area.

RETURN OF SUPPLIES

Supplies that are defective or sent in error should be returned for credit. A credit slip is similar to an invoice except for the word "credit" stamped or printed on it, and is sometimes a different colour. It will be mailed to your office, and should be filed with invoices, and checked against the monthly statement in order to ascertain if proper credit has been given to the account.

BACK ORDERS

A notice of back order is sent out by the supply company if their stock is temporarily depleted of a particular item. It usually states that items listed below are not in stock, but will be sent at a later date. The assistant should note any items back ordered and reorder if not received within a reasonable length of time. If there is an urgent need for an item, an attempt should be made to obtain it from another supply company, and if available, the original order may be cancelled.

PAYMENT OF SUPPLIES

Monthly statements are received by purchasers from business firms on or about the first of each month. In most instances these list only the invoice number, date of purchase, and amount. It is important that the invoices and credit slips be checked closely with the statement. In a well-managed office, all accounts over one dollar are paid by cheque by the tenth of each month. A petty cash fund is a convenient method of payment for small accounts and incidental expenses. In most offices cheques for all professional expenses are prepared by the dental assistant or receptionist, and signed by the dentist. The cheque is then mailed with the statement to the business firm with a request for a receipt. After the receipted statements have been returned, they should be carefully filed with the attached invoices. Canadian Income Tax Regulations require that all receipts and

cancelled cheques should be retained for a minimum of five years, and after that period, permission must be granted by the Tax Division of the Dept. of National Revenue before any records can be destroyed. The cost of all supplies is recorded in the office bookkeeping system, which may be used to determine office overhead costs, as well as being available for tax information.

STORAGE AND CARE OF SUPPLIES

The ideal storage space for most supplies is in cabinets or cupboards. The following facts should be noted:

- All drugs should be bottled and labelled. The labels should be read at the time of each usage to avoid errors.
- All tops on bottles should be tight to avoid contamination.
- Small medicine and cement bottles should be arranged conveniently in dental cabinets. Bottles containing liquids should be equipped with droppers, and if kept in drawers, supported so they will not fall when drawers are opened.
- Drawers and shelves of cabinets should be kept spotlessly clean and tidy. When using an item, remove it from the cabinet to avoid spilling inside the drawer.
- Reserve supplies should be stored for future use.

Certain items require special care:

- X-ray films should be placed in a lead-lined box designed for that purpose as films may be exposed prematurely if they are near an X-ray machine.
- Some drugs such as antibiotics should be kept in cold storage to maintain their efficiency. Information on the package will give directions.
- Gold and other precious metals should be kept in a strong box or safe.
- Bulky items such as plaster and stone may be kept in the lab or back room which is dry and away from moisture.
- Inflamable items such as ethyl chloride or ether must be kept away from heat or flame.
- Acids such as hydrochloric and sulphuric should be stored separately as fumes from these acids may cause corrosion or damage to metals or other supplies

The dental assistant should be familiar with the place of storage of all items in order to expedite office routine and any office procedure. It is important that she acquaint herself with those supplies which have a limited shelf life, and should plan to use those items first which have been on the shelf the longest. (i. e. anaesthetic solution, antibiotics, X-ray film, cement liquids, etc.)

QUESTIONS AND ANSWERS

1. Enumerate the sources from which supplies used in a dental office may be obtained.

Supplies used in a dental office may be obtained from:

- (1) dental supply companies
- (2) pharmacies and drugstores.
- (3) stationery shops, book stores, and printing companies.
- (4) medical supply companies.

2. Discuss the term "back order".

A notice of back order is sent out by a supply company if their stock is temporarily depleted. It usually states that items listed below are not in stock, but will be sent at a later date. The assistant should make a note of these items and reorder them if they do not arrive within a reasonable length of time.

3. Certain items in the dental office require special care in storage. List and explain your reasons for each.

Some items requiring special care in the dental office when storing are:

- (1) Some drugs such as antibiotics should be kept in cold storage to maintain their efficiency.
- (2) X-rays should be kept in a lead-lined box designed for that purpose as films may be exposed prematurely if they are near an X-ray machine.
- (3) Acids such as hydrochloric and sulphuric should be stored separately as fumes from these acids may cause corrosion or damage to metals or other supplies.
- (4) Gold and other precious metals should be kept in a strong box or safe to ensure safety.
- (5) Materials such as plaster and stone must be kept where it is dry and away from moisture, and because of their bulk are usually kept in the lab.
- (6) Inflamable items such as ethyl chloride or ether must be kept away from heat or flame.

Ref: "The Dental Assistant" - Brauer et al, Chapter 7)

INTRODUCTION

The study of anatomy is the study of form and size of the parts of the body and their relationship to one another; physiology is the science of their function. A knowledge of the normal anatomy and physiology of the human body forms the fundamental basis for an understanding of human biology, without which an understanding of abnormal structure and function is impossible. This is as true for teeth as for any other part of the body.

The following section includes sufficient information about the form and function of teeth, of the bones and the tissues that support them, and of the muscles that make them function, so that students will be able to understand later lectures dealing with diseases of the teeth and their supporting structures.

BONES OF THE ORAL CAVITY

Twenty-two individual bones are fastened together to form the human skull, eight of these are combined to form the cranium, and the rest make up the skeletal structure of the face. Of this latter 14 we are particularly interested in the three major bones which form the upper and lower jaws and which support the teeth - the two maxillae and the mandible.

The Maxilla (Fig. 14, 15, 16)

There are two maxillae, the right and left, united in the median line of the face to form the upper jaws, most of the hard palate, the bony framework of the cheek, and the floor of the eye. Each maxilla consists of a body and four processes (or projections) called the zygomatic, frontal, palatine and alveolar processes. The body of the maxilla contains the large air space - the maxillary sinus or antrum - which drains into the nose through a small hole in the lateral wall of the nasal cavity.

The frontal process of the maxilla extends along the side of the nose to meet the nasal bones and the bones of the forehead to help form part of the bridge of the nose. The zygomatic process extends outwards and back to meet the zygomatic bones to form the major skeletal support for the cheek. The palatine process extends inwards to meet the palatine process of the other side to form most of the hard palate. The horseshoe-shaped alveolar process extends downwards and contains the sockets for the upper teeth.

Several openings or foramina open onto the surface of the maxilla, and through these run nerves and blood vessels of considerable importance to dentists. At the back of the palate on each side is the major palatine foramen, and just behind the

upper front teeth is the incisal or naso-palatine foramen, and through these run the nerves and blood vessels supplying the roof of the mouth. The superior alveolar foramina on the posterior surface of the alveolar process form the openings for the nerves which supply the upper back teeth. The infraorbital foramen opens on the anterior surface of the body of the maxilla just under the lower border of the eye to serve as the exit for the vessels and nerves to the upper lip and gums around the teeth and the front of the mouth.

The Mandible (Figs. 14, 15 and 17)

The mandible consists of two parts - the body and the ramus. The body is the main part of the jaw and a ramus extends upwards on each side at the back of the body. The mandible has three processes; - the condyloid process which projects upwards from the posterior border of each ramus to form part of the temporo-mandibular joint, and the coronoid process which extends from the anterior border of the ramus upwards. These two processes are separated by the deep sigmoid notch. The third process on the mandible is the alveolar process, which, like that of the maxilla, is horseshoe-shaped and forms the bone supporting the lower teeth.

Two pair of foramina open onto the surface of the mandible. First the mandibular foramina are located at about the centre of the inside surface of each ramus. The nerves and blood vessels to the lower jaw and teeth enter the bone through this opening. The other foramina are called the mental foramina and they open onto the outer surface of the mandible just below the roots of the bicuspid teeth to permit the nerves and blood vessels to the lower lip to exit from the mandible.

The Mucosa

The term mucosa refers to the lining of the mouth. It is a shortened form for mucous membrane, a name given to all the wet membranes which line all the body cavities.

The mucosa is formed of two major components, a thin surface sheet of epithelial tissue supported by a layer of fibrous connective tissue. The epithelium contains no blood vessels and it is several cells thick, the thickness varying with the amount of wear to which it is exposed.

The connective tissue support for the epithelium is composed of interwoven fibres in a relatively thin jel of "intercellular substance". This connective tissue layer ties the epithelium to the underlying bone or muscle, and forms the support for blood vessels and nerves which supply the mouth. It varies in thickness depending on its location in the mouth, being quite thin over the alveolar process and hard palate, and thicker at the sides of the palate and in the lips and cheeks.

The ducts of tiny mucous glands, which secrete their material on to the epithelial surface to keep it moist and lubricated, run through the connective tissue and form small openings through the epithelium.

THE SALIVARY GLANDS (Fig. 9)

Because the lining of the mouth requires constant lubrication, and because we need to mix most food with fluid to make it suitable for swallowing, we have been supplied with secreting organs called glands to provide the necessary fluid. Three pairs of these glands occur as large circumscribed organs discussed further below, while others form a series of tiny glands buried in the lips and cheeks, which, because of their size are not individually important, but collectively secrete a great deal of material. Secretion from the oral glands not only keeps the lining of the mouth moist and lubricates the food, but also assists in clearing food debris from the teeth after eating.

Further discussion will be limited to the three pairs of major salivary glands, - the parotid, the submaxillary, and the sublingual.

The Parotid

The parotid is the largest salivary gland. It is located just below and in front of the ear and is partly hidden behind the ramus of the mandible. Its thin watery secretion empties into the mouth through a long duct which passes forwards along the outside of the mandibular ramus and penetrates the cheek wall opposite the upper second molar tooth. The opening of the duct is readily visible in the mouth.

The Submaxillary Gland

The submaxillary gland is just medial to the body of the mandible running from the angle of the jaw about half way to the chin. Its duct passes forward to open on to the floor of the mouth through a series of small openings just under the tongue. Submaxillary secretion is a mixture of thin watery fluid and mucous.

The Sublingual Gland

The sublingual gland is found in the floor of the mouth on each side toward the anterior part of the mouth, and it empties its secretion into the mouth through the same series of openings that drain the submaxillary gland. The sublingual gland secretes a thick sticky mucous secretion.

THE TEETH

We refer to an individual's collection of teeth as his dentition, and humans acquire two dentitions during their lives, - a primary dentition and a permanent dentition. The period during which the primary dentition is being lost and replaced by the permanent dentition is called the mixed dentition period.

The first primary (baby, deciduous, milk) teeth erupt when the child is about six months old and all are present by two years. There are twenty primary teeth, five in each quadrant, named from front to back respectively, the central incisor, lateral incisor, cuspid, first molar, and second molar.

The first permanent teeth erupt at approximately six years of age and from that time until about the age of eighteen others follow, some replacing the primary teeth and some erupting behind the last of the primary teeth. There are 32 permanent teeth, eight in each quadrant, and they are named from front to back respectively, central incisor, lateral incisor, cuspid, first bicuspid (premolar), second bicuspid (premolar), first molar, second molar, and third molar. The incisors, cuspids and bicuspids all replace primary teeth, the bicuspids replacing the primary molars. The permanent molars have no primary predecessors. The permanent dentition is intended to serve an individual throughout his lifetime.

The incisor and cuspid teeth are spoken of collectively as the anterior teeth, and the bicuspids and molars as the posterior teeth.

FUNCTIONS OF THE TEETH

Teeth can be considered to serve three major purposes - mastication or chewing, esthetics, and speech. Of the three, the masticatory is biologically the most basic and most important, and it is for this purpose that our teeth have been designed.

The incisors are shaped like small shovels with a wide flat crown and a relatively long sharp cutting edge to incise or cut food. The cuspids were originally designed in nature for grasping or holding food, and in humans, while this primitive function has been lost, the basic form of the tooth still remains and the cuspids have a relatively long, strong, pointed crown (the point is called a cusp). The bicuspids (two cusps) are designed for breaking up food into pieces small enough for milling before swallowing. The molar teeth are large and meshed together like mill-stones to grind food into small enough pieces to be swallowed.

While modifications for function in the roots of teeth is not as apparent as in the crowns, nevertheless roots vary from one group of teeth to another. Incisors have conical rounded roots, sufficiently strong to support them in their sockets. Cuspid roots, while basically the same shape as those of incisors, are generally much longer and far more able to resist stress than incisor roots. With the exception of the upper first bicuspid which has two roots, all of the bicuspids are supported by a single conical root generally somewhat flattened on the sides. Because of the heavy pressures brought about when the molars grind together these teeth are supported by more than one root. Lower molars have two large roots and upper molars have three.

SURFACES AND LANDMARKS ON TEETH

In dental practice it is necessary to designate specific surfaces of the crowns of teeth, as when charting the shape and size of cavities or in specifying the shape or design of dental restorations, and therefore each of the five surfaces of the tooth crown has been given a special name, either according to location or to function.

The surface of anterior teeth which contacts the lips is called the labial surface, - a name derived from the latin word for lip. On bicuspid and molar teeth the equivalent surface contacts the cheek, and accordingly is called the buccal surface. On all teeth the opposite surface of the crown is the lingual surface, a term derived from the latin word for tongue. The surface nearest the mid-line of the body is called the mesial surface, and the opposite surface is the distal surface. The cutting edge of anterior teeth is called the incisal edge. The comparable surface in posterior teeth is called the occlusal surface from the latin word meaning to shut together. Thus each anterior tooth has a labial, lingual, mesial, and distal surface, and an incisal edge. Each posterior tooth has a buccal, lingual, mesial, distal and an occlusal surface.

For convenience we also divide each surface of a tooth into "thirds" both mesio-distally and bucco-lingually, and from the occlusal surface (or incisal edge) towards the root. These are then referred to as the mesial, central, and distal thirds, or the occlusal, central and cervical thirds (the cervix is the neck of a tooth) and so on.

A Line-angle is the edge of the crown where two adjacent surfaces meet, e. g. the mesio-buccal line-angle. The point of junction between three adjacent surfaces is called a point-angle, e. g. the mesio-buccal-occlusal point-angle.

When teeth are arranged normally in a mouth each tooth (except the last teeth in the arch) touches two others, and the point on the crown where they meet is called the contact point. The mesial surfaces of central incisors contact one another, and with this exception the mesial surface of each tooth contacts the distal surface of the tooth immediately in front of it.

The adjacent sides of teeth diverge from one another from the contact point in all directions, and the more or less triangular areas outlined by the two sides of the teeth with the apex at the contact point have specific names. The space between the contact and the bone of the alveolar process is called the interproximal space. In a normal healthy mouth this space is filled with a conical projection of a gum tissue called the interproximal papilla. Radiating out from the contact point lingually, buccally and occlusally are three spaces or embrasures which are named respectively the lingual, buccal and occlusal embrasures. Of these, the occlusal embrasure is the smallest.

STRUCTURE OF TEETH

A tooth may be divided into two parts, a crown and a root, and the junction is the cervix or cervical line. The crown is the portion of the tooth covered with enamel. The enamel-covered crown is properly called the anatomical crown, as opposed to the clinical crown which is the portion of the tooth that projects beyond the gums into the mouth. The clinical crown may or may not be identical to the anatomical crown. In newly erupted teeth, when the gums have not yet fully receded, the clinical crown is smaller than the anatomical crown, but in older people whose gums have receded part-way down the roots of the teeth, the clinical crown may exceed the anatomical crown in length.

Each tooth is formed of three hard, calcified tissues, - enamel, cementum, and dentin. Enamel, the hardest tissue in the body, and covers the tooth crown. It is an inert, translucent, highly mineralized material. Because of its nature and because the cells of the body which produce it disappear after it has been formed, enamel cannot be repaired biologically, and if lost either by decay or by accident, must be replaced artificially.

Cementum covers the anatomical root of the tooth in a thin layer. It is not as hard as enamel or dentin and is about the same consistency as bone. Cementum fastens the fibres that hold the tooth in the socket to the tooth.

The main bulk of the tooth is made of dentin. Dentin is harder than bone and cementum but not as hard as enamel, and it forms the "ivory" of teeth. It conforms roughly in shape to the outer form of the tooth and is covered in the crown by the cap of enamel, and in the root by cementum.

In addition to these three calcified components of teeth there are soft tissues which are also of immediate concern to dentists. Inside the dentin is a space called the pulp cavity which roughly conforms in shape to the external form of the tooth. Normally the pulp cavity is filled with a soft delicate tissue called the dental pulp in which the blood and nerve supply to a tooth is found. The pulp is continuous from the crown down each root (through pulp canals) and communicates with blood vessels and other tissues outside each root through a small hole called the apical foramen.

Outside the cementum of the root is a fibrous connective tissue membrane called the periodontal membrane which firmly fastens the tooth to the bone of the alveolar process. This membrane is comprised mostly of tiny tope-like fibres which extend from the bone lining the tooth socket to the cementum on the root, and the ends of the fibres are partially buried in each. In addition to attaching the tooth to bone, the periodontal membrane carries a very rich blood supply and nerve supply. The latter supplies the delicate sense of touch to teeth.

ERUPTION OF TEETH (see page 85)

Tooth eruption is a process which goes on intermittently over approximately the first 18 years of life. The primary incisors are the first to erupt at about six months after birth. The lower incisors generally precede the uppers and the centrals erupt ahead of the laterals. At about the age of one year the primary first molars erupt followed by the cuspids about four months later. The second primary molars (the last of the primary dentition) is usually present by about the age of two.

For further teeth erupt for a period of about four years, when at about the age of 6 or 7 the first permanent molars erupt distal to the second primary molars. Soon after, the permanent incisors erupt, replacing the primary incisors which are shed. Between the ages of about 10 and 13 years the bicuspid, cuspid and second molars erupt, the bicuspid replacing the primary molars, and the cuspid replacing the primary cuspid. Thus by the time a child is 13 or 14 he has no primary teeth left in his mouth and all the permanent teeth except the first molars are present. The latter generally erupt around the age of 18, although the eruption time for these teeth is much more irregular than for others.

DIFFERENTIATING CHARACTERISTICS BETWEEN THE TEETH

All incisor teeth are somewhat shovel-shaped. All have a single pointed root more or less rounded in the upper jaw and flattened on the mesial and distal surfaces in the lower. Upper incisors are larger than lowers and the upper central incisor is larger than the lateral. The reverse is true in the lower jaw where the lateral incisor is the larger. Incisors are widest mesio-distally from the contact point to contact point. Labio-lingually their widest measurement is in the region of the cervix. The lingual surface on the lower incisors is quite smooth but on the upper incisors there may be a number of grooves and ridges present. On the lingual surface of all incisors the large bulge of enamel in the cervical region is called the cingulum.

Cuspid teeth derive their name from the presence of the single conical projection or cusp on the cutting edge of each tooth. Thus, the incisal edge of cuspids is pointed rather than long and straight as in incisors. Each cuspid has a single root which is larger than incisors, and the upper cuspid is wider mesio-distally than the lower. The root of the lower cuspid is quite flattened on the sides so that this root is considerable wider labio-lingually than mesio-distally.

Bicuspid, as the name implies, generally have two cusps, - one buccal and one lingual, and the buccal cusp is the larger of the two. The cusps are separated by deep groove which runs across the crown mesio-distally from the mesial to the distal pit. On the lower first bicuspid the lingual cusp is very small, resembling a slightly overgrown cingulum rather than a cusp. There are often two lingual cusps on the lower second bicuspid, one mesial and one distal. All bicuspids have a single conical root except the upper first bicuspid which has two roots, - one buccal and one lingual.

The molars are the largest teeth and each has four or more cusps, In general molars decrease in size from first to third, although the third molar is subject to so much variation in form that this rule does not always completely hold.

The upper first molar has four cusps, a mesio- and a disto-buccal, and a mesio-and a disto-lingual. Of these the mesio-lingual is the largest and the disto-lingual is the smallest. The buccal and the lingual cusps are separated from one another by a long central groove running across the tooth mesio-distally. Other grooves run buccally and lingually from this to separate the buccal and lingual cusps. Very frequently a fifth cusp (the cusp of Carabelli) is present on the lingual surface of the mesio-lingual cusp. The second upper molar is smaller than the first, and does not have a fifth cusp.

The lower first molar has five cusps, three buccal and two lingual. The deep central groove snakes across the occlusal surface mesio-distally to separate the buccal from the lingual cusps, and from it run other grooves to separate the individual cusps from one another. The second lower molar generally has four cusps, the distal buccal cusp being last.

Upper molars have three roots, two buccal and one lingual; lowers have two roots, one mesio and one distal.

THE PHYSIOLOGY OF OCCLUSION

Occlusion occurs when the upper and lower teeth come together as in chewing. In the following section we shall discuss the arrangement of the teeth in the jaws and their relationship to one another in occlusion, as well as the muscles and joints related to chewing.

ARCH AND ARCH FORM

The teeth are arranged in a parabolic arch and the upper arch is larger than the lower so that upper teeth overlap the lower teeth both labially and buccally when the jaws are closed. Each upper anterior tooth is wider mesio-distally than its corresponding lower tooth, and therefore when the teeth are closed together, each upper tooth meets its own counterpart in the lower jaw plus a portion of the next tooth distal. That is, the upper central incisor meets the lower central incisor and a portion of the lateral incisor. The upper lateral meets a portion of the lower lateral and lower cuspid. The upper cuspid meets the lower cuspid plus part of the lower first bicupid and so forth.

The plane on which the teeth meet one another in occlusion is not flat, but is curved from side to side and from front to back with the convexity of the curve facing downwards. The antero-posterior curvature is called the Curve of Spee.

THE TEMPORO-MANDIBULAR JOINT

The upper jaw is immovably fixed to the skull, while the lower jaw is quite freely moveable and fastened to the skull through the temporo-mandibular joint. This

int, which is really two joints in one, permits the lower jaw to go through a variety of movements which can basically be broken down to four: - an opening and closing movement through a relatively simple hinge action, a lateral side to side movement, a protrusion, and a retrusion.

The union between the mandible and the skull is strengthened by the heavy joint capsule (which is strong though flexible) and by other supporting ligaments which tend to prevent dislocation of the mandible.

MUSCLES OF MASTICATION

The movements of the mandible are controlled by a number of muscles acting either singly or in groups. The four most important muscles are called the muscles of mastication, and their names are Masseter, Temporal, Internal Pterygoid, and External Pterygoid. All are paired muscles and all are fastened on the one hand to some point on the mandible and on the other to the skull.

The Masseter is a strong rectangular muscle covering the outer surface of the ramus of the mandible, fastened to the outside of the mandible near the angle of the jaw and onto the skull on the lower border of the zygomatic arch. Its action is to help close the jaw.

The Temporal muscle is a large fan-shaped muscle attached to the coronoid process of the mandible and fastened over a broad area to the side of the skull. The Temporal muscle also assists in closing the jaw and in retruding it.

The Internal Pterygoid is fastened to the inside of the angle of the mandible opposite the attachment of the Masseter muscle, and to the skull in the pterygoid fossa at the back of the maxilla. This muscle also assists in closing the jaw. Thus the Masseter, Temporal and Internal Pterygoid all act to close the teeth together and the Temporal also causes retrusion.

The External Pterygoid is fastened to the inside of the condyle of the mandible and to the outer surface of the lateral pterygoid plate on the skull. Because of the direction of its fibres, when it contracts it helps pull the condyle forward as the jaw opens, or it is responsible for protrusion.

THE FUNCTIONAL FORM OF TEETH

The relation of teeth to one another in the arch and the relation of the arches to one another when the teeth are closed in their most central position has already been mentioned briefly. Carrying on with this topic, - the upper anterior teeth project slightly beyond the lowers. This projection is called overjet. In addition, the upper teeth usually overlap the lower teeth to some degree and this overlap is called overbite. In an ideal occlusion the overbite and overjet is within one millimeter.

Some description of the contact relations of the upper teeth to the lowers when the teeth are closed has already been given. It should be noted that because the upper arch is larger than the lower the incisal edges of the lower anterior teeth will meet the lingual surface of the upper anterior teeth.

Since the upper anteriors are wider mesio-distally than the lowers, each upper anterior therefore overlaps its own counterpart in the lower jaw plus a portion of the next tooth distal. This has the effect of placing the tip of the cusp of the upper cuspid in the buccal embrasure between the lower cuspid and the lower first bicuspid, i. e. distal to the lower cuspid. The tip of the buccal cusp of both upper bicuspids fits into the buccal embrasure distal to its own counterpart, i. e. the buccal cusp of the upper first bicuspid fits the buccal embrasure between the lower first and second bicuspid, and the buccal cusp of the upper second bicuspid fits the buccal embrasure between the lower second bicuspid and first molar. The mesio-buccal cusp of the upper first molar therefore fits into the buccal groove between the mesio-buccal and centro-buccal cusp of the lower first molar. The disto-buccal cusp of the upper first molar fits into the embrasure between the lower first and second molars. A similar relation occurs between second molars.

The lingual cusp on the upper first and second bicuspids fit into the distal fossa of the lower first and second bicuspid respectively. The mesio-lingual and disto-lingual cusp of the upper first molar fit into the central fossa and distal fossa of the lower molar respectively and a similar relation occurs between the upper first and second molars.

In an ideal relationship teeth are so arranged that when the jaw moves from side to side with the teeth in contact, cusps on both sides of the mouth are in contact at all times.

Thus, the pressure brought to bear on the teeth is distributed over as many teeth as possible. Such a relationship is called a balanced occlusion.

The teeth are not absolutely perpendicular in the jaws. Upper posterior teeth tend to be inclined outwards slightly and the corresponding teeth in the lower jaw are inclined lingually. Both upper and lower anterior teeth are inclined slightly outwards. In addition upper molars are inclined slightly distally and lower molars mesially. Bicuspids are fairly straight mesio-distally and the anterior teeth tend to incline slightly mesially in both jaws. These inclinations are such that when forces are directed on the teeth they tend to keep the contact relations between teeth in each arch very tight which tends to prevent the teeth from drifting out of their correct alignment and maintain the integrity of the arch.

The relation between the crown of the tooth and its root is such that when force is applied to the tooth the force tends to be directed down the long axis to the root. The lingual cusps on upper posteriors and the buccal cusps on lower posteriors are kept well with the labio-lingual dimensions of the root since these are the cusps on which most force is directed when the teeth come in contact with one another.

TOOTH CURVATURES

Tooth crowns are so designed that they tend to protect and maintain the health of the supporting tissues, e. g. the gums, periodontal membrane, and alveolar bone.

The mesial and distal contact points project outwards further than any other point on the sides of teeth, and the sides of the teeth then slope away from the contact point in all directions forming the embrasures and the interproximal space. These spaces act as spillways for food when it is chewed so excess is deflected to each side of the teeth and prevented from being driven down between the contact points to harm the gum tissue in the interproximal space.

The height of contour on the labial and buccal surfaces of teeth is located just above the cervical line. This slightly raised portion or cervical ridge has the effect of deflecting food away from the gum tissue to prevent it being driven down into the crevice between the gum and the tooth and at the same time permitting some contact between food and the gums which acts as a stimulus to good health in the gums.

On the lingual surfaces of teeth the height of contour in the anterior portion of the mouth is in the region of the cingulum and in posteriors about half way up the crown. These heights of contour also act in a similar fashion to those on the labial and buccal surfaces.

X FUNCTION AND CARE OF DENTAL EQUIPMENT

1. CHAIRS

Function:

- (a) To comfortably accomodate all patients and permit adjustment and flexibility as required by the doctor.

Care:

- (a) Lubrication of mechanism by operating full lift several times daily.
- (b) Use of silicone polish and cleaner.
- (c) Avoid use of dry solvent on leather seat, back or head pads.

2. LATHES

Function:

- (a) To supply a controlled speed device for cutting, trimming, polishing etc.

Care:

- (a) Refill oil cups, or oil both bearings (2 drops each) monthly.
- (b) Sealed bearings or oilite bearings do not require lubrication.
- (c) FREQUENTLY remove plaster stone and pumice from the vicinity of switch and bearings.
- (d) Turn off when not in use.

3. COMPRESSORS

Function:

- (a) To supply sufficient clean dry air pressure for syringes and air driven handpieces.
- (b) Minimum air requirements for air driven handpieces 40-50 PSI at 1 CFM. (Miniature Handpieces and Moisture Eliminators require additional pressure)

COMPRESSORS (Cont'd)

Care:

- (a) Drain moisture from air receiver at least weekly.
- (b) Check crank case oil level MONTHLY.
- (c) Oil bearings monthly SAE #20.
- (d) MAINTAIN Air space around compressor.
- (e) Turn off - or unplug electrical connection each night.
- (f) Rubber pad reduce vibration - donnaconna board helps eliminate noise.

HIGH VOLUME EVACUATORS

Function:

- (a) Used primarily for "High Speed" Dentistry, to remove moisture from oral cavity, permitting better vision less expectorating, and more patient comfort.

Care:

- (a) Flush thoroughly with cold water after each use.
- (b) Some types require bottle or cannister to be washed with soap and warm water WEEKLY to eliminate odour. Use of Germicidal.
- (c) Turn off when not in use.
- (d) CAUTION do not close both air apertures at one time.

ASPIRATORS (Motor Driven)

Function:

- (a) Designed primarily for surgery to keep "dry field".

Care:

- (a) Do not permit bottle to over-fill, motor damage will result.
- (b) Empty bottle and wash thoroughly after each use. Rinse tubing with cold water.

5. ASPIRATORS (Motor Driven) Cont'd

- (c) Keep extra chamois disk (motor protector) available.

6. STERILIZERS

Function:

- (a) Sterilization of instruments.

Care:

- (a) Change water daily.
- (b) Use S.S. White tablets daily.
- (c) Ritter tablets monthly to reduce lime. DO NOT use with instruments. Rinse thoroughly before next use.
- (d) Avoid use of muriatic ACID.

Dry Heat:

- (a) Excellent for root canal instruments and sharp edged instruments.
- (b) Avoid high heat with soldered joint instruments.

7. AUTOCLAVES

Function:

- (a) To make sterile rubber and cotton goods glass and metal instruments

Care:

- (a) Necessity of interior cleaner used monthly.
- (b) Exterior cleaning with damp cloth while warm.

General:

- (a) Use of Tempils and Diack controls. (assurance of sterility)
- (b) Suggested High absorbency Material for Packs.
- (c) Prepared kits for surgical and operative instruments.
- (d) How to eliminate most "wet instrument" problems through technique.

7. AUTOCLAVES (Cont'd)

- (e) PRESSURE TEMPERATURE and TIME (10 minutes minimum at 15 pressure).

8. X-RAY MACHINE

Function:

- (a) To record on film, normal and pathological conditions of tooth bone and surrounding tissue.

Care:

- (a) AVOID head striking wall, light post, etc.
- (b) AVOID head being placed over sterilizer (steam) or hand basin.
- (c) Yearly - drop of oil on arm joints.

Failure to operate:

Check: Supply cord, circuit breaker, fuses.

General:

- (a) Faster timers and longer cords available for older machines.
- (b) Use of various length cones.
- (c) Use of aluminum filters, lead diaphragm, aprons, lead shields, and leaded walls in new construction.

Dark Room Problems:

- (a) If tank connected to copper plumbing - flush frequently with water.
- (b) Use RUBY BULB or WRATTEN FILTER.
- (c) Eliminate all light sneaks around doors and windows.

9. DENTAL UNIT

Function:

- (a) To supply such services as water (warm and cold), air (warm and cold) gasburner, cuspidor, bracket table, dental engine, diagnostic light, cautery and pulp tester.

9. DENTAL UNIT (Cont'd)

Care:

- (a) Cuspidor bowl should be cleaned after each patient.
- (b) Gold trap cleaned and washed daily.
- (c) Do not use lye or other harsh cleaning material in bowl. Never flush hot water in bowl.
- (d) Oil engine MONTHLY 2 to 5 drops as indicated by manufacturer. DO NOT OVER OIL.
- (e) Change engine brushes frequently if speed over 10,000 rpm (3 months).
- (f) Use of controller lengthens life of brushes.
- (g) Controllers to high speed engines should be ventilated - cleaned and lubricated by a qualified service man every 6 months.
- (h) Use Dental engine oil or High speed oil only on dental engines.
- (i) Saliva Ejectors: Rinse full glass cold water through after EACH patient. Clean screen daily by removing and washing in warm water. DO NOT discard screen.
- (j) Belt: Tension important.
- (k) Belt Wear: Check pulley guard and covers for sharp corners, and protruding screws in pulleys of Handpiece.

10. HANDPIECE (Regular)

Function:

- (a) To provide a safe flexible and controlled transmission of engine speed to operate burs, diamonds, rubber or brushes, etc.

Care:

- (a) Change handpieces and angles frequently - permit metal to "rest".
- (b) Use proper handpiece designed for your engine speed. Over 10,000 rpm. Ball Bearing HP and angles recommended.
- (c) Clean and oil daily. Dry solvent as cleaner is excellent if critical point understood. Blow dry with warm air before re-oiling.

10. HANDPIECE (Regular) (Cont'd)

- (d) Method of cleaning handpieces and angles.
- (e) If angle cannot be cleaned last thing at night, leave in a bottle of oil to soak until next morning.

11. AIRDRIVE HANDPIECES

Function:

- (a) A more flexible handpiece operating in the Ultra Speed range from 100, to 350,000 rpm.

Care:

- (a) FOLLOW MANUFACTURER'S INSTRUCTIONS explicitly - each differs considerably from the other.
- (b) Clean, dry air essential - drain compressor weekly or more frequently, if humidity requires.
- (c) If not equipped with automatic moisture eliminator, control box should be drained of moisture daily.
- (d) Proper pressure and flow from compressor necessary. Air filters reduce pressure.
- (e) Water filters should be cleaned every 6 months, or more frequently in areas of mineral or hard water. Use water line cleaner.
- (f) Oil change and use of cleaner as prescribed by manufacturer (lubricator, tubing and handpiece).
- (g) Do not handle turbine unnecessarily. Avoid dust, lint, etc. Back cap tension important.
- (h) Change plastic chucks frequently for best cutting efficiency.

12. AIRTORQUE HANDPIECES

Function:

- (a) To operate in low speed, 0 - 25,000 rpm with high torque.

Care:

- (a) Clean, oil and sterilization.

13. GENERAL:

- (a) Read all manufacturer's instructions carefully BEFORE use.
- (b) NEVER over-oil. Use oil designed for equipment - compressor engine, airtor, sterilizer etc.
- (c) Use silicone base polish for duco surfaces.
- (d) Wipe interior or operating light weekly to remove dust caused by air convection.
- (e) Carbide Burs may be autoclaved, boiled, dry heat or oil sterilized. Avoid alcohol or cold sterilizing solutions except CETYLICIDE or HACITAN.
- (f) X-Rays, Autoclave, Sterilizer, Compressor or any high amperage device should be connected direct, or into grounded wall outlet. Avoid use of extension on these devices.

51 DENTAL HAND INSTRUMENTS AND THEIR CARE

There must have skillful and efficient team work between doctor and dental assistant if we are going to instill confidence in the mind of the patient.

One of the first duties of an assistant is to familiarize herself with the dental instruments.

1. To know the name of an instrument.
2. To be able to describe an instrument.
3. To have an understanding of its use.
4. To know where it is kept in the cabinet.

Modern operative Dentistry high speed instrumentation has reached a new degree of comfort for the patient by reducing heat and vibration, which are frequently responsible for the patient's fear of pain.

Note

Follow the manufacturer's instructions relative to general maintenance cleaning and sterilizing of handpieces.

STERILIZATION OF INSTRUMENTS

Sterilization is the destruction of pathogenic organisms and their spores on instruments and in materials. It is the duty of every dental assistant to ensure the safety of the patient against the spread of infection.

PREPARATION OF INSTRUMENTS

Use an instrument brush kept for this purpose.

Remove blood or debris by scrubbing instruments thoroughly with soap and water.

Rinse with clear water.

Dry with a clean towel.

METHODS OF STERILIZATION

Thermal - Moist - Boiling in closed or open Chamber (autoclave)

- Dry - Open flame
- Dry heat in closed chamber (dry heat oven)

Chemical - Cold sterilizing

Boiling (a) Water sterilizer with instrument tray

(b) Sufficient water to cover instruments when tray lowered.

(c) Add sterilizer tablets to prevent corrosion.

(d) Boil instruments 20 minutes minimum.

- Autoclaving
- (a) Steam under pressure.
 - (b) Most effective means of sterilizing.
 - (c) High temperature destroying spores and bacteria.
 - (d) Length of time will vary with materials to be autoclaved.

- Direct Flame
- (a) Sterilize instruments only made of material that will withstand the heat of open flame.

- Dry Heat
- (a) Dry Heat oven
 - (b) Temperature required 320°F for 1 hour.
 - (c) Used for instruments that should not be sterilized with moist heat, such as cutting edges and root canal instruments.

- Chemical
- (a) Cold sterilization.
 - (b) Has limited use
 - (c) Strength necessary maybe injurious.
 - (d) Length of time required is a disadvantage.

- Hot Oil
- (a) Use an oil sterilizer with special oil that will withstand the high temperature - some oils will smoke and have an odor beyond certain temperatures.
 - (b) Instruments such as scissors are kept lubricated and free of rust by this method .
 - (c) Sharp edges are not dulled.
 - (d) Hand pieces should be re-lubricated after sterilization.

All instruments should be kept surgically clean by avoiding contact with the hands.

1. Remove sterile instruments from sterilizer with sterile transfer forceps.
2. Place instruments on sterile towel.
3. Dry by patting instruments with sterile towel.
4. Store instruments in a dust proof sterile environment.

HAND INSTRUMENTS

NAME of parts:

- (a) Handle or shaft - straight part held in hand
- (b) Shank-connects the handle or shaft with the blade (maybe straight, curved or angled)
- (c) Blade - the part bearing the cutting edge.

General Set-Up Used for all operations

1. Mouth Mirror
2. Explorer
3. Cotton pliers
4. Periondontal Probe

Formula of Hand Instruments:

A number or a series of numbers stamped on the handle-manufacturer's identification.

1. First figure-width of blade-in tenths of m.m.
2. Second figure-length of blade in m.m.
3. Third figure-Angle of blade with the shank or shaft in hundredths of a circle.
4. When fourth number added it is used in second place, the number indicates the angle of the cutting edge.

Hand Cutting Instruments: Single or double ended.

1. Chisels
2. Enamel Hatchet
3. Hatchet
4. Angle Formers
5. Hoe
6. Gingival Margin - Trimmers
7. Discoid
8. Cleoid

Instruments with cutting edge - sterilize in autoclave, dry heat or oil.

BURS

- (a) Made of steel or carbide.
- (b) Various sizes and shapes.
- (c) Used to cut tooth structure-shaping cavities for fillings.

Types - Round - plain or dentate.

Inverted cone.

Fissure - cross cut

- taper

- plain

- end cutting

To Sterilize Steel Burs

- (a) Clean with wire brush
- (b) (Lightly) brush lengthwise on blade of bur
- (c) Sterilize - hot oil, dry heat oven autoclave, cold sterilization solution

To Sterilize Carbide Burs

- (a) Clean with wire brush
- (b) (Lightly) brush lengthwise on blade of bur.
- (c) Sterilize - boiling water, hot oil, Dry heat oven or autoclave

Note:

Generally Carbide burs should not be cold sterilized or wiped with alcohol.

Carbide burs remain sharp and usable if rotating before touching tooth structure.

DIAMOND INSTRUMENTS

- Various sizes and shapes made of particles of diamonds in steel.
- Expensive (care needed)
- Metal contact - clean with ink eraser

To Sterilize

- (a) Clean with stiff brush and soapy water.

(b) Sterilize - cold sterilization.

urs, Diamond Instruments, carborundum stones, etc. shanks in two sizes.

1. Short shank used in angle and Contra Angle Handpiece

ote: All burs, Diamond Instruments and carborundum stones, should be mounted immediately after being sterilized for convenience. The different types should be kept in separate bur locks.

EXCLUSION OF MOISTURE INSTRUMENTS

1. Rubber dam Punch

2. Clamp forcep

3. Saliva ejector

FILLING MATERIAL INSTRUMENTS

malgam: 1. Carrier

2. Pluggers

3. Carvers

ement: 1. Spatula

2. Plastic Instrument

ilicate: 1. Spatula

2. Plastic Instrument

old Foil 1. Automatic Mallett

2. Points

3. Carrier or holder

TORING OF INSTRUMENTS IN CABINET

rom the stand point of efficiency and economy of time-instruments should be systematically arranged in the cabinet.

1. Cutting and plastic filling instruments usually kept in top drawer.
2. Instruments kept in order of size.
3. Instruments for the same operation kept together; such as Examination and prophala.

A. DEFINITION AND PRINCIPLES OF OPERATIVE DENTISTRY

Definition of Operative Procedures

Those operations upon the natural teeth for the repair of damage inflicted by caries and for the prevention of further caries.

All dental procedures are considered from the standpoint of the patient's general welfare rather than from that of the teeth and their supporting structures alone.

Principles

1. To relieve and prevent human discomfort.
2. To maintain health through proper mastication of food.
3. To promote social acceptability through appearance and speech correction.
4. To aid in replacement of partially missing teeth.
5. To reduce the incidence of periodontal disease and its resulting ruin of human dentitions.

B. PREPARING THE OPERATORY FOR THE PATIENT

1. Preparation and Checking of Operatory

(a) General Cleanliness and Arrangement

Two essentials must always be met, namely

(i) Cleanliness

(ii) Neatness

throughout the whole operatory as well as in the vicinity of the dental chair and unit.

(b) Proper Ventilation

(i) Air conditioners

(ii) Electric fans

(iii) Various window arrangements

as a consideration for the comfort of the patient and office personnel -

e.g. - odors from smoking, eating, etc.

- vapors from medicines or chemicals.

(c) Patient Daily Appointment List - Slide # 1

essential in efficiently managed operatories
essential for effective utilization of appointment times
essential as a treatment guidance sheet

(d) Cleaning the Dental Chair and Unit **Remember:

No trace of a previous operation must remain when a patient is brought into the operatory.

Bracket Tray

- (i) If bracket tray used, remove and discard
 - 1. bracket-cover sheet
 - 2. paper cup waste receiver and replace with new ones.
- (ii) Wipe off any foreign matter off edge of tray with an alcohol swab.
- (iii) If used, remove air syringe bulb and sterilize
- (iv) Remove saliva ejector
- (v) Clean unit's air and water syringe if necessary

Chair

- (vi) Clean arms and seat of chair if necessary
- (vii) Replace or clean headrest covers

Unit

- (viii) Remove all debris from the dental unit
- (ix) Wipe all items on unit used by dentist or assistant, i. e. - handpieces, airtors, etc. Slide # 2
- (x) Make certain that bowl cuspidor is cleaned on both OUTER and INNER surfaces.

(e) Placement of Patient's X-Rays upon the X-Ray viewer.

(f) Preparing the Set-Up for Different Operations

- (i) Each operation is noted on the daily appointment sheet as per slide # 1
- (ii) Each respective tray set-up must be ready when patient seated in chair
- (iii) Tray set-ups as per slides.

- # 6 - Plain Tray
- #12 - Examination Tray and # 9 - Tray in Position
- #13 - Amalgam Tray
- #14 - Silicate Tray
- #15 - Inlay Preparation Tray
- #16 - Copper band Dispenser
- #17 - Inlay Cementation Tray
- #18 - Amalgam Mixing Area.

Considerations:

- (1) The assistant must anticipate the dentist's every need in any given operation.
- (2) The instruments and materials must be prepositioned in order to eliminate
 - (i) searching
 - (ii) selecting of same
- (3) The bracket table must have an appearance which will offer a more psychologically favourable environment for the patient.

C. PREPARING THE PATIENT

Considerations:

- (1) The assistant must have a pleasant and considerate attitude toward the patient to reduce anxiety - since dental treatment, at its best, is not a pleasant experience.
- (2) Through personal contact the assistant sets the decor for the practice.
- (3) If patient is a lady, place handbag in suitable position - Slide #3.

(a) Adjusting the Chair

Patient must be made comfortable in the chair.

- (i) Lower chair - so foot level as close to floor as comfortable
- (ii) Assist elderly patients into chair by holding patient's arm
- (iii) Tilt back of chair at a slight angle
- (iv) Back cushion to be adjusted to the height of the patient so that patient's back centered in back rest
- (v) Head rest must support the back of the head just below the prominence

Final adjustment of chair made by the dentist prior to washing hands and treating patient.

(b) Adjusting the Operating Light

- (i) Light must fall into the mouth - not the eyes of patient
- (ii) All further adjustment of light to be made by assistant.

(c) Washing the Hands

- (i) This must be done to knowledge of patient
- (ii) Hands washed each time assistant leaves room and returns to operatory.

(d) Placement of Napkin, Towel or Throw (Cape)

- (i) If plastic throw used - place fresh napkin on top

(e) Placement of Water Glass on Unit

- (i) Use lukewarm water with mouthwash
- (ii) Place water in glass after patient seated always

(f) Replace Sterile Saliva Ejector, Air Tips, etc.

0. PRINCIPLES GOVERNING CHAIR SIDE ASSISTING

1. The assistant must anticipate the dentist's every need at all times to provide an efficient and effective service for the patient.
2. She must allow the dentist to devote all his time to the education and treatment of the patient.
3. Her activities must be co-ordinated with the dentist's so that he is not kept waiting at any time.
4. Her assistance should provide
 - (a) Ease
 - (b) Accuracy
 - (c) Speed of manual operations
 - (d) Rhythm
5. Her actions, through a minimum of hesitation should reduce
 - (a) Fatigue
 - (b) Mental and nervous strain for the dentist
6. Her advance planning should save appreciable chair time to be used for the treatment of patients as expected.

DUTIES TO BE PERFORMED IN OPERATORY

A. Treatment

(1) Charting the Mouth

- (i) Method - two requirements
 - (a) To understand patient's chart
 - (b) To understand particular charting method
- (ii) Knowledge
 - (a) Names, positions, surfaces of teeth
 - (b) Caries classification
 - (c) Caries and periodontal nomenclature

(2) Administration of Anaesthesia - Slide # 14

- (i) Syringe loaded with anaesthetic cartridge during tray set-up
- (ii) Syringe never waved before patient prior to injection
- (iii) All items for injection handed in sequence without verbal direction
- (iv) All items must be within easy reach of patient
- (v) Keep cotton roll or plastic cover over needle of syringe at all times - except during injection
This prevents
 - (a) Burring or dulling the sharp end of needle
 - (b) protects the needle against contamination
- (vi) Remember:
Contact of the needle must be limited to the oral tissues of the patient.

(3) Application of the Rubber Dam

- 1. Pre-arrange rubber dam set-up - Slide # 14
- 2. Apply a lubricant to tissue side of rubber dam.
- 3. for ease and speed of application of rubber dam.

(4) Cavity Preparation

- 1. Keep instrument set-up in proper order - Slide # 13.
- 2. Replace instruments to be re-used in proper order.
- 3. Place discarded instruments in separate order
- 4. Remember:
Any disorder in instrumentation is a disturbing delay.
- 5. Note assistant's position at the chair in wash-field operating technique - Slide # 6.
- 6. Assistance must be such as to avoid interruption of operation.
- 7. Remember:
A good chairside assistant is definitely a dentist's "second pair of hands".

(5) Restorations

- (1) Knowledge of preparations of all restorative materials necessary for efficient and effective assistance.
- (2) Cements - proper manipulation must be adhered to i.e. proportioning, mixing and handling
- (3) Amalgam - preparation and handling must be smooth and rapid - Slide # 19, # 5.

- (4) Gold Foil - Preparation of Tray - Slide #
Assistance should be largely confined to the conveyance of foil pellets
- (5) Inlays
Instruments and materials must be arranged for a smooth operation - Slide # 15
- (1) Wax impressions for direct technique
- (2) Compound impressions - copper bands - Slide #16
- (3) Hydrocolloid Impressions
- (4) Rubber Base Impressions - (Orstat)(Gingi-Pak)

3. Non-Treatment

1) Stocking the Operatory

- (a) All materials used in the operatory must be maintained at an optimum supply at all times
- (b) All materials must be conveniently placed and easily accessible.

2) Cleaning and Sterilization of Instruments

- (a) Familiarity with and recognition of all instruments necessary
- (b) All contaminated hand instruments must be first scrubbed with soap and water
- (c) Sterilization process of choice must be adhered to as per instructions by the manufacturer
- (d) Remember that boiling water will corrode cutting instruments which are made of carbon steel
- (e) Large instruments - like the rubber dam punch, are to be sterilized preferably with a sponge saturated with ethyl alcohol (70%)
- (f) Instruments contaminated with wax or thermo plastic material (gutta percha) to be cleaned by heating the instrument in a gas flame to soften the material slightly and remove it quickly with a paper towel.
- (g) Bur blades to be cleaned with a steel brush
- (h) All precision-type handpieces to be thoroughly wiped with alcohol swab
- (i) All non-precision handpieces to be cleansed, sterilized and lubricated in an oil sterilzer.

CONCLUSION

For total economy (health, wealth and happiness) in the dental office, there must be a proper synchronizing of duties between the dentist and the chairside assistant.

2. The assistant must be alert and efficient in
 - (a) timing the dismissal of the patient
 - (b) preparing the operatory for the next patient
 - (c) admitting the next patient
3. There must be no trace of an operation just completed when the next patient is ushered into the operatory.

THE DISCOVERY OF X-RAYS

- Wilhelm Konrad Roentgen, November, 1895
Dutch Professor of Physics, University of Wurzburg, Bavaria
- Probably not the first to produce X-rays, as experiments for 40 years with Geissler and Crooks tubes, but first man to become aware of their presence.
- Roentgen received first Nobel prize in Physics for his discovery.

IMPORTANCE OF X-RAYS IN DENTAL PRACTICE

- Scientific practice of dentistry impossible without X-rays; only means of visualizing internal structure.
- Often the only means of discovering hidden lesions.
- Verifying and gauging the extent of known lesions.
- Determining and measuring the progress of growth and development.
- Checking the progress of treatment.
- Essential aid in examination, diagnosis, treatment planning and prognosis.

Examples:

Caries	Discovery of hidden lesions. Extent of lesions-proximity to pulp. Size of pulp chambers.
Periodontics	Detection of calculus Degree and type of bone loss
Prosthodontics	Inclination of roots. Value of roots as foundations.
Paedodontics and Orthodontics	Unerrupted teeth. Growth and development.
Endodontics	Extent of lesion. Progress of treatment. Post-operative check-ups.
Surgery	Location and extent of lesions or impacted teeth

- * Dr. Leroy Ennis 25 ladies studying dental hygiene - 12 cases of rarefying osteitis; 79 caries lesions and other lesions, of various types found by X-ray.

WHAT ARE X-RAYS?

- Electromagnetic radiation family.

Radiation-propagation of energy in wave form; also the energy so propagated.

- Common characteristics of all electro-magnetic radiations:

- * Travel through space in wave motion
- * Same speed as light
- * Give off electrical and magnetic field as they travel

- Fundamental difference is in their wave lengths:

- * Radio waves (thousands of metres in length)
- * Infra red
- * Visible light
- * Ultra violet
- * X-rays
- * Gamma rays
- * Cosmic rays - less than a billionth of a centimetre.

- X-rays (from X-ray tubes), gamma rays (from natural disintegration of radioactive substances), and cosmic rays (from outer space) are called ionize atoms, i. e. break them up into positively and negatively charged particles or ions.

- It is ionizing radiation with which we are concerned when referring to biological hazards of radiation.

PROPERTIES OF X-RAYS

- Invisible
- Travel in straight lines
- Penetrate opaque substances
- Affect photographic film in same manner as light
- Produce fluorescence in crystals of certain chemical compounds
- Ionizing effect

HOW ARE X-RAYS PRODUCED?

- X-rays produced when a stream of electrons (electric current) travelling at high speed in a vacuum is projected against a metal target.
- Coolidge tube - glass vacuum tube with electrode at each end.

- Cathode - cup shaped, containing tungsten wire filament. Filament has separate circuit to heat it.
- Anode - copper, with tungsten target set at angle.
- Filament produces available electrons when heated.
- High potential difference (kilovoltage) applied between electrodes-causes electrons (electric current) to travel at high speed from cathode to anode, where they strike tungsten target. Cup shaped assembly of cathode aims the electron stream at a small spot on tungsten target-the focal spot.
- Heat and X-rays produced.
- Heat transmitted by copper.
- X-rays directed outside of tube.
- Central ray passes through tip of plastic cone.

HOW X-RAYS PRODUCE A SHADOW IMAGE ON FILM

- X-ray film or photographic film is a sheet of cellulose derivative with a coating of silver halide (usually bromide) crystals dispersed in gelatin - an emulsion.
- When the emulsion is exposed to X-rays or light, an invisible change (not well understood) takes place in the crystals. This change is such that the exposed crystals become susceptible to the action of certain chemicals (developing agents). These agents reduce the exposed silver bromide crystals to visible black metallic silver; the unexposed crystals are unaffected. The black metallic silver forms the image which we see when we view an X-ray film or a photographic film.
- The density or blackness of the image at any area on the X-ray film is proportioned to the amount of radiation which fell on that area (i. e. the number of exposed bromide crystals).
- X-rays penetrate living tissue in inverse proportion to the density and thickness of the tissue.
- Some of the body tissues in order of decreasing density are as follows:
 - * Enamel
 - * Dentin
 - * Bone
 - * Soft tissue

- So when an X-ray film is placed against the teeth and adjacent tissue and X-rays are directed towards it, the enamel stops most of the rays that strike it, allowing only a small proportion to pass through to reach the film; dentin allows a larger proportion, bone a still larger proportion, and soft tissue allows nearly all of the rays to pass through to the film. Consequently, the corresponding areas on the developed film are graded in density from almost white (enamel) through shades of gray (dentin and bone) to almost opaque black (soft tissue).

DANGERS OF X-RAYS

- At first, not known if any adverse effects on human body.
- Effects soon became apparent - skin reddening (erythema) - dry, cracked skin ulceration.
- Years before full effects realized - leukemia, anemia, and malignant skin lesions amongst radiologists.
- However, the serious somatic effects of overexposure to radiation have now been known for decades.
- So why the recent concern about radiation hazards? Genetic effect.
- Experimentation on animals and plants has revealed that gene mutations occur when reproductive cells irradiated, resulting in defective offspring.
- Reasonable assumption that same thing happens in humans.
- Human race has always been exposed to ionizing radiation - cosmic rays, emanations from radioactive substances in the earth's crust, even the food we eat. Called natural or background radiation - 100 milliroentgens (mr.) per year (see glossary) or 3 r in 30 years.
- This amount apparently does little damage since human race not degenerating.
- How much artificial radiation (X-rays can we safely add?
- At present, it is felt (somewhat arbitrarily) that in the first 30 years (reproductive years) no more artificial radiation should be added than an amount equal to the natural or background dose - i. e. 3 roentgens.
- How serious is the hazard from dental radiography? Somatic effects negligible if patient not recently exposed to large doses and proper precautions taken. For any possible genetic effect, gonads must be irradiated. If certain precautions taken, only a very small amount of radiation reaches the gonads when a complete series of dental X-rays taken - less than the amount from one day of natural and background radiation.

PROTECTIVE MEASURES

(a) The Patient

The patient may be irradiated as follows:

- * Primary radiation (see glossary) to face.
- * Primary to gonads if careless technique.
- * Secondary to gonads by scatter from face or tube head.

The following protective measures may be employed:

- | | |
|-------------------------|--|
| (i) X-ray machine | attachments (collimation, filtration and shielding) to reduce the beam to the smallest practical diameter, reduce the proportion of soft (see glossary) rays and prevent leakage of rays from the tube head. |
| (ii) High speed films | Film emulsions vary in sensitivity to radiation. The higher speed films require less radiation to produce a picture. The increased "graininess" of the fastest films may limit their use in some cases. |
| (iii) Lead rubber apron | Placed over patient's chest and lap. Almost completely eliminates radiation to gonads. |

(b) The Operator

The operator may be irradiated by secondary from patient, or primary, if careless.

The following protective measures may be employed:

- (i) No holding of films in patient's mouth!
- (ii) Stand out of path of central beam.
- (iii) Stand at least 5 feet away from patient.
- (iv) Use film badge to check on radiation received. If badge registers radiation, increase distance from patient or stand behind lead screen.

The use of a safe X-ray machine and high speed films will, of course, reduce the danger to the operator as well as to the patient.

PARTS AND CONTROLS OF AN X-RAY MACHINE

(a) Tube Head

- * X-ray tube
- * Step-up transformer - tube current

- * Step-down transformer - filament current.
- * Oil-insulation and heat transfer.
- * Shielding - radiation protection.
- * Plastic cone - pointer.
- * Vertical angulation scale.

(b) Arm

Support and positioning of tube head.

(c) Body

- * Line switch
- * Kilovolt metre and control knob
- * Milliamperemeter and control knob
- * Timer control dial, cord and button

OPERATION OF X-RAY MACHINE

- * (1) Turn on line switch. Filament heats up.
- * (2) Turn kilovolt control knob until desired kilovolt reading on metre (usually 50 to 90 kv.)
- * (3) Set timer control dial to desired exposure time.
- * (4) Aim tube at safe area, depress timer button, and note milliamperemeter reading.
- * (5) Adjust milliamperemeter control knob and repeat trial exposure until desired reading on milliamperemeter. (usually 10 to 15 milliamperes).

N.B. Kilovoltage is read before exposure and milliamperage is read during exposure.

Above is the basic procedure; some steps unnecessary in newer machines.

Machine is now ready for use.

ASSISTING THE DENTIST IN MAKING THE X-RAY EXPOSURE

- Prepare machine for use, as above
- Seat patient in chair and hand him some absorbent tissue
- Adjust back and head rest of chair so patient is seated erect, with mouth at convenient level for operator.

- Have patient remove eyeglasses and dentures, if wearing same.
- Place leaded rubber apron.
- Remove film from holder and hand to operator; then leave room.
- As each exposure is made, give operator new film, dry exposed film with tissue; mark name of patient on film and place in lead receptacle.
- When exposures completed, fold bracket arm of X-ray machine, turn off line switch.

CARE OF X-RAY MACHINE

- Very expensive apparatus
- Dusting, polishing
- Turn off when not in use; remove plug from wall at night
- Fold bracket arm when not in use

DENTAL FILMS

*Nature

Sheet of cellulose derivative coated with an emulsion of silver halide (usually bromide) and gelatin. Some films coated on both sides.

* Intra Oral Film

(i) Periapical

- * "around the apex"
- * held in mouth by finger or appliance
- * three or more teeth and surrounding area

(ii) Bitewing

- * "Wing" to bite on
- * Crowns and alveolar crest - 1 (caries and bone levels, etc.)
- * Both arches on one film

(iii) Occlusal

- * Placed against occlusal surfaces
- * Much larger film
- * Large areas of disease, fracture, etc.

Intra Oral Film Packet

Paper cover - white outside, black inside, with tab on back for opening.

- Moisture resistant
- Light resistant

Lead Foil backing

- Stiffness
- Radiation absorption

Black paper covering film

- Light resistant

Film

- single or double
- raised dot - raised side is tube side

* Extra Oral Film

- * Much larger - 5 x 7, 8 x 10 or larger
- * Placed against face or head
- * Jaws, temporomandibular joint, sinuses, facial profile, growth and development, etc.
- * Supplied in sheets in light-tight box.
- * Cardboard holder or metal cassette with intensifying screen

FILM PROTECTION

- * From heat, light, radiation
- * Stored film - lead-lined box in cool place
- * Film in current use - Lead dispenser
- * Exposed film - lead receptacle.

FILM PROCESSING

- * Consists of developing, rinsing, fixing, washing and drying.
- First three accomplished with safelight illumination only.
- * Developer
 - Reduces exposed silver bromide crystals to metallic silver
- * Fixer
 - Removes unexposed crystals
- * Components of Developer:
 - (i) Developing agents, - elon and hydroquinone
 - Elon - density
 - Hydroquinone - contrast.

- (ii) Preservative - sodium sulphite - to retard air oxidation.
- (iii) Activator - sodium carbonate - (an alkaline medium necessary.)
- (iv) Restrainer - potassium bromide
 - controls rate of development
 - inhibits tendency of developer to reduce unexposed crystals of silver bromide - chemical fogging.

* Components of Fixer:

- (i) Fixing agent - hypo (sodium thiosulphate)
 - (Converts unexposed silver bromide crystals to freely soluble salt (silver disodium thiosulphate) which water can wash away.
- (ii) Preservative - same as in developer
- (iii) Neutralizer - acetic acid - to neutralize any developer carried over on film

Preparing Solutions

- Chemicals obtained in powder form or in stock solutions:

Follow Manufacturers Directions!

Processing Technique

- (i) Clean, dry bench
- (ii) Stir developer and fixer - glass or plastic rod
- (iii) Determine temperature - 68°F. is optimum temperature.
Adjust temperature, if necessary. Always stir before reading temperature.
- (iv) Set timer according to time temperature table.
- (v) Turn on safelight, turn off white light and ensure that darkroom is dark. Lock door!
- (vi) Open film packet - handle by edges only to avoid fingerprints.
- (vii) Attach film to hanger securely; test each film by trying to remove it.

(viii) Start timer and immerse hanger in developer.

- tap sharply to remove air bubbles.

- constant movement first minute

- intermittent movement thereafter

(ix) When bell rings, remove hanger, and let excess drip into developing tank.

(x) Rinse in water at least 30 seconds with constant motion

(xi) Place hanger in fixer for 10 minutes

- tap to remove bubbles

- constant motion first minute; intermittent thereafter

= may be removed for quick viewing by dentist after first 3 minutes, if necessary.

(xii) Washing - 20 minutes in running water

- While it may not be possible to keep water at same temperature as developer and fixer, it should not be too cold.

(xiii) Drying - shake off excess water and hang up in dry place. Don't move film again until perfectly dry

General Processing Precautions:

- * Keep developer, rinse water and fixer at approximately the same temperature, and wash water not too cold.
- * Dark room - dark! Clean, and dry.
- * Hangers - must be dry before use.
- * Films - must not contact each other.
- * Tank - keep covered when not in use.
- * Solutions - change regularly, at least once a month, and clean tank.
- * Developing - never shorten developing time - results in weak film. lacking in contrast.

Some Causes of Faulty Radiographs

(i) Film too light

(a) Underexposure (X-ray machine)

(b) Underdevelopment (Dark room)

Should never occur if solution is changed regularly, the temperature is not allowed to drop below 60° and the time temperature table is adhered to when determining developing time.

(ii) Film too dark

- (a) Overexposure
- (b) Overdevelopment

Assistants please note:

If the X-ray exposure was correct and the developer temperature not over 75°, it is almost impossible to overdevelop! Many assistants blamed for overdeveloping a dark film when the fault was the operator's for over-exposing the film.

This does not mean you can leave it in the developer while you write a letter home! If greatly overdeveloped - chemical fog.
(see next section)

(iii) Fog

(Darkening of the film due to reduction in the developer of silver bromide crystals other than those comprising the image)

(a) From daylight

If film dark around edges - prolonged exposure of packet to daylight - should be kept in container.

If entire film darkened - exposure of naked film to daylight - leak in dark room.

(b) From unsafe "safelight"

Manufacturer's directions as to strength of safelight and distance from film.

Can test with an unexposed film and lead strip.

(c) From X-rays

Unsafe storage of film, before or after use; should always be protected by lead container.

(d) From excessive overdevelopment

- called chemical fog
- Developer starts reducing unexposed silver bromide crystals
- Usually occurs only when developer temperature over 75°

(iv) Image sufficiently dense but lacking in contrast.

(a) Overexposure and underdevelopment.

- commonest cause
- sidespread practice to save time in dark room!

- hydroquinone (which is slow working) not given time to build up contrast.

(b) Exhausted developer

(c) Developer too cold - under 60° (hydroquinone inactivated)

(d) Fog (see previous page)

(e) Higher kilovoltages (90 KV) result in less contrast than lower kilovoltages (65KV)

(v) Blurred image

movement of patient, film or tube

(vi) Stained Film

(a) Immediate

(1) Allowing chemicals or any moisture to touch film before processing - wet fingers, bench or film rack.

(2) Insufficient rinsing - film reaches fixer with much developer still on it.

(3) Film removed early from fixer for viewing and not returned at once to fixer.

(4) Contaminated solutions.

(5) Film contacting another film, wall of tank or another hanger.

(b) Delayed

(1) Insufficient fixing.

(2) Insufficient or inefficient washing.

(vii) Paper stuck to film

film packet not dried after removal from mouth

(viii)

Small round clear spots

Air bubbles.

(ix) Fine black lines

film creased

(x) Orange peel appearance (reticulation)

sudden temperature change during processing (usually results from too cold wash water)

(xi) Rainbow effect

Scum on surface of developer

(xii)

Film completely clear

film placed in fixer first. (Don't laugh - it happens!)

X-ray machine not functioning. Watch milliamperere metre.

MOUNTING

Mounting films

Mounts - cardboard or plastic with windows for periapical and/or bitewing films

- * There are dozens of shapes, sizes and numbers of windows. Each dentist has his preference.
- * Commonest types are bitewing mounts (with 2 windows for 1 pair of bitewings or multiple windows for successive pairs) and full mouth or complete series mounts with from 12 to over 20 windows.
- * Films are mounted in a complete series mount according to anatomical location of teeth in jaws:

UPPER

2nd molar 1st molar cuspid lateral centrals lateral cuspid 1st molar 2nd molar

2nd molar 1st molar cuspid centrals cuspid 1st molar 2nd molar RIGHT

LOWER

- * At Toronto - usually view from labial and buccal, as if facing the patient.
- * So right side of mount - left side of arch
- * Raised dot - concave side is lingual; convex side is buccal or tube side.
- * When mounting place films on table with convex side of dot up.

* Divide films into upper and lower arches by observing anatomical landmarks:

Upper - incisors wide
 - molars - 3 roots
 - floor of nose
 - nasal spine
 - incisive foramen
 - antrum
 - zygomatic process
 - tuberosity

Lower - Incisors narrow
 - Molars - 2 roots

- Divide films into left and right sides.
If the distal (referring to the anatomical surfaces of the teeth on the X-ray) is on right side of film, film is of left side of arch, etc.
- Films are now ready to mount.
- The patient's name and the date should be entered on the mount and the mount placed with the patient's chart for viewing by the dentist.

SOME TYPICAL X-RAY APPEARANCES

Normal * Enamel, dentin, cortical bone, unerupted teeth, etc.

Abnormal * Caries, rarefying osteitis, condensing osteitis, etc.

GLOSSARY OF TERMS

Radiodontics (Dental Radiology)

The study which embraces the making and interpretation of radiographs as a diagnostic aid in dentistry.

Dental Radiography The science of making radiographs

Radiographer A person trained in radiography

Radiologist A person trained in radiology

Dental Radiograph A completed transparent picture, formed by the use of X-rays, which records the shadow images of the teeth and associated structures.

Radiopaque Substance	One which resists to a high degree the passage of X-rays through it. Resulting white shadow on radiograph called a "radiopaque area" or "area of radiopacity".
Radiolucent Substance	One which offers little resistance to the passage of X-rays through it. Resulting dark area on radiograph called a "radiolucent area" or "area of radiolucency".
Definition or Detail	The sharpness of the image.
Contrast	The degree of difference between blacks and whites in an X-ray film.
Grain	The clumps of metallic silver which form the image in an X-ray film. The larger the clumps, the coarser the grain, and consequently, the poorer the definition.
Primary Radiation	Radiation emanating directly from target of the X-ray tube.
Secondary Radiation	Radiation which is scattered from substances that are hit by the primary beam.
Dose	When X-rays are applied to the body, some are absorbed, some are transmitted. The absorbed portion is called the "dose".
Roentgen	The unit of dosage
Milliroentgen	1/1000 or a roentgen.
Soft and Hard Radiation	Every X-ray beam is composed of a mixture of varying wave lengths. The longer wave lengths are relatively non-penetrating, and are referred to as soft radiation; the shorter wave lengths are more penetrating and are referred to as hard radiation. The soft rays are scattered at or just below the skin; they therefore contribute nothing to the X-ray picture but can have the same detrimental biological effect as other radiation. Hence the use of aluminum filters in the beam to filter out as much soft radiation as possible.

General Remarks

Paedodontics is that specialty devoted to dentistry for children. This is one of the youngest specialties and although it is difficult to understand why, it was one of the last specialties to achieve recognition. Only the faintest rumblings of interest were shown in the mid-twenties and from then until the mid-forties any pronounced expression of interest in this field was considered strange. Fortunately the lights of intelligent reasoning revealed that good adult dental health was predicated upon sound dental health during childhood.

In many respects dentistry for children is the same as adult dentistry except that the patient is smaller. In detail, however, there are many differences that require understanding and consideration. These differences are neither difficult nor unpleasant but are basically a matter of common sense and good judgement.

A. Child Reactions

A child's future in every respect lies before him. His future emotional reactions to dental treatment and the dental environment will be the product of his early experiences within this environment and its extrinsic influences. Those associated with dental treatment, including parents, play a large part in the development of this reaction.

Although it is not necessary to be an advanced student in child psychology in order to participate in the dental treatment of children it is most helpful to understand certain factors that are indigenous to child behaviour.

Every child or organism from birth has a goal. Anything that thwarts or appears to interfere with the attainment of this goal causes an emotional reaction. A child has two emotional reactions to things that thwart his goal:

1. Attack.... this reaction is portrayed by anger.
2. Escape.... this reaction can result merely from a new situation.
the newer the situation the greater desire to escape.

There is nothing wrong with a child exhibiting fear. Without fear there could be no courage, and the greater the fear, the greater the courage necessary to overcome the fear. It would however be quite wrong not to assist children as much as possible in overcoming their fears by minimizing the causes of these reactions. Such simple measures as avoiding a sudden loss of support in lowering the chair or head rest, and the creating of unnecessary loud noises are examples of understanding and assistance. Yet another is that of giving the child assurance by means of good skills and competent manner.

B. Telephone

The initial contact is usually made between the parent and the dental assistant by the telephone. The importance of the first contact cannot be overstressed.

1. Courteous manner . . . a special effort is required at all times to at least sound pleasant.
2. Diplomacy and Patient . . . Not infrequently the parent is more apprehensive concerning a first visit than the child. Many such misgivings can be agreeably dispelled by a few confident and carefully chosen words from the dental assistant.
3. Accuracy and Promptness . . . no one appreciates an undue lapse of time before a telephone call is answered - answer as promptly as possible . . . without subjecting the parent to an inquisition during the first call, it is mandatory to obtain accurately certain facts pertinent to the new child patient e.g. name, sex, age, referred by, telephone number, address, parents initials, and dental complaint - if any.
4. Giving an appropriate appointment
 - early in the day if patient very young or a problem.
 - away from other new or difficult patients
 - mentioning specific practice methods if any, such as requiring the patient to enjoy the reception room environment during the child's treatment.

C. Reception Room

1. The reception room should be kept neat and clean, and as inviting as possible. Pictures and fixtures should be appealing, and there should always be an adequate supply of reading material for children.
2. The arrival of a patient should be acknowledged as soon as possible, particularly if the patient is new.
3. The child and parent are met for the first time in the reception room by the dental assistant and/or the dentist. Greetings should be friendly but brief and the child's first name remembered and used.
4. Everything should be kept in readiness once the child has been admitted to the operating room, to facilitate the parent's retreat to the reception room if this is desired.

D. Operating Room

1. The operating room should be maintained in a spotlessly clean condition at all times and as free as possible of all frightening objects and sights. Needles, forceps, bloody sponges, sharp instruments, steam and so on.
2. A mixture of genuine friendliness and confident efficiency assist a child to adjust to a new environment and new people. Particularly is this true and helpful when a child has been separated from the known security of its parent's presence.

E. Actual Dental Appointment

1. During an appointment, particularly if it is a child's first visit, it may be helpful to return for a short time to the business office thereby reducing the reaction. Often the fewer people present the less the confusion.
 - this might well be the time for a few words or reassurance to an overwrought parent pacing the reception room floor.
2. When assisting the dentist during treatment -
 - look pleasant and say little if the situation is difficult.
 - above all do not repeat the dentist's instructions to the child or in any way attempt to assist in the control of the patient unless required.
 - avoid loud noises or abrupt motions.
 - avoid ill chosen words, such as 'needle, pull, blood'!
 - avoid all comment about the child's appearance, unless compliments.
 - use the child's first name liberally; a child likes his own name.
 - never leave a child alone for any reason.

F. Business Office

Everything should be done ahead of time when opportune, to assure the smooth and punctual flow of patients, particularly their departure. Suitable appointment should be arranged prior to the termination of the appointment thus leaving only the collection of the fee, if customary or possible, and the farewells.

G. Dismissal of Patients

There should be no apparent sign of haste at this stage, however, undue delay with idle chit chat creates difficulties in punctuality.

The dentist's post operative instructions to the parent should be heard and heeded by the assistant.

The 'good-by' should be as sincere as the 'hello'.

H. General Office Decorum

Cleanliness, friendliness, thoughtfulness, integrity, and common sense will take care of all situations within the scope of a dental assistant's personal ability.

Miscellaneous Considerations:

1. Familiarity with basic paedodontic facts such as terminology, number of teeth, eruption of teeth, danger of biting anaesthetized area.

- . Recording special information for future reference (children who have sent Christmas cards, etc.)
- . Providing the dentist with an accurate and informative Day List.
- . Verifying appointments and making sure that the recall system is effective.
- . Intercepting nuisance telephone calls to the dentist and keeping personal calls to a minimum.
- . Respecting the privacy of office procedures when away from the office.

Parents want their children's dental treatment rendered painlessly, quickly and inexpensively. We cannot fulfil their wishes completely but we can offer maximum treatment to a maximum number of patients, at a minimum cost, only with the efficient and co-operative services of our dental assistants. You play a major role in the administration of our health service.

1. DEFINITION OF DIET AND NUTRITION

Diet

- food and drink regularly consumed.
- food and drink prescribed.

Nutrition

- Utilization of food in the body for growth, maintenance and repair.
- The science of nutrition deals with the composition of foods, laws governing food requirements and the principles of digestion, absorption, assimilation or utilization and elimination.
- the processes by which the body is nourished and maintained in a state of vital health.

2. GENERAL PUBLIC STATUS AND CONCEPTS OF NUTRITION

Malnutrition - people may starve or have disease due to lack of adequate or proper food.

Causes of malnutrition

- lack of food
- lack of money to buy food, i. e. relationship between family income and adequacy of diet.
- lack of knowledge of what foods to purchase.
- inadequate facilities or knowledge in the storage of foods.
- disinterest in the preparation of foods.

Status and Concepts of Nutrition

- income does not determine the status of nutrition of an individual but, rather, knowledge of selection, storage and preparation of food .
- factors such as appeal and cost which influence selection.

- self-imposed diets for weight reduction, ethnic choices, individual food habits, food aversions.
- foods high in calories, low in nutrient values which satisfy hunger.
- appetite, or lack of appetite does not determine the nutritional needs of an individual.
- a subsistence diet may reduce the body stores leaving no margin of safety.
- the necessity of required daily amounts of the essential nutrients.

RELATIONSHIP OF NUTRITION TO DENTAL HEALTH

- general body health and dental health.

Nutrition affects Dental Structures

- (a) growth and development of teeth, jaws and adjacent soft tissues: -
 - essential nutrients present at required intervals, in required amounts for growth.
 - essential nutrients after growth for maintenance and repair.
 - dental decay and periodontal disease the result of inadequate nutrition or inclusion of certain types of food in the diet.
- (b) Dental - Caries Activity Control:
 - the presence of carbohydrates and acid - producing bacteria as a recognized cause of dental decay.
 - elimination of refined carbohydrates as a dental - caries control measure.
- (c) Prevention and Control of Periodontal Disease:
 - well-balanced diet important to maintain health of the periodontium.
 - vigorous chewing of hard, fibrous foods stimulates the periodontium.

THE ESSENTIAL NUTRIENTS - proteins, carbohydrates, fats, minerals, vitamins.

Proteins

- major constituents of the protoplasm and nucleus of body cells.
- necessary for growth and maintenance.

- essential components of enzymes and hormones, the chemical regulations of the body.
- antibodies and immunological substances are proteinous in nature.
- proteins are large molecules composed of amino acids.
- the molecule is composed of approximately 21 amino acids, 8 of which are "essential" for growth and repair, the remaining are "non-essential".
- "complete" proteins contain all of the essential amino acids, "in-complete" proteins do not.
- "negative nitrogen balance" results if there is a deficiency of one of the essential amino acids. It results in weight loss, appetite loss and impaired ability to synthesize protein substance.
- "positive nitrogen balance" desired for optimum health occurs when the amount of nitrogen as protein exceeds the amount excreted.
- sources - the animal, proteins meat, fish, fowl, eggs, milk cheese; the plant proteins - cereal grains, legumes and some nuts.
- 1. gm. protein $\rightarrow$ 4 calories of energy
- 1. gm. of protein required per kgm (2.2 lbs.) of body weight per day.
- protein should supply 13% to 16% of total caloric need per day.

Carbohydrates

- chemical substances composed of C, H, O in which ratio of H to O is 2 to 1.
- CHO utilized in the body for heat and energy.
- 1 gm. CHO $\rightarrow$ 4 calories.
- sources are inexpensive - potatoes, bread, table sugar.
- refined carbohydrates supply only CHO.

Fats

- fatty acids plus glycerol → fats
- 1 gm. fat → 9 calories (a concentrated source of energy)
- fats slow down digestion thus delaying hunger
- sources are meat, milk, butter

Minerals

- minerals essential to normal body function are Ca, P, Fe, I, Na, K, Cl, Mg, S, Cu, - Ca, Fe, P, I most often absent from diet.

(a) Calcium and Phosphorus

- required by the body from pre-natal stage to 18 years of age for growth for bones and formation of teeth.
- daily requirement after growth completion is 0.6 to 0.7 gms. Ca and P per day, in adolescence is 1.5 gms. Ca and P per day, in children under 12 years is 1 gm Ca and P per day, during pregnancy is 1.5 gms.
- sources of Ca are milk, cheese, cauliflower, bread (milk and cheese supply 2/3 daily requirement, all other foods supply remainder).
- sources of P are meat, fish, eggs, vegetables and cereals.

(b) Iron

- the haemoglobin of the red blood cells, which contain a large amount of iron is important for transportation of oxygen.
- requirements for men and children 6 mgm. daily, women and adolescents 12 mgm. daily.
- pregnancy and adolescence, periods of rapid growth, require greater amounts.
- sources are beef, eggs, spinach and milk, (small amount)

(c) Iodine

- necessary for the function of the thyroid gland. Deficiency causes goitre.

- the hormone secreted by the thyroid gland controls energy metabolism of the body.
- source of iodine is the soil → plant → animals
↓
→ man
- iodized salt is a preventive measure employed in a geographical area where there is an iron deficiency in the soil.

Vitamins

- Hormones and vitamins.
- organic compounds which act on food to release energy.
- are not synthesized in the body.
- functionally vitamins do not contribute to the structure of the body.
- fat soluble vitamins: A, D, E, K.
- water soluble vitamins: B, C.

(a) Vitamin A

- formed in body from carotene.
- sources are green, leafy vegetables, liver, carrots, yellow vegetables, milk.
- functions - essential for growth, prevention of night-blindness, to maintain healthy skin, to maintain normal moist mucosal surface of the eye.

(b) B-Complex vitamins

- all act as enzymes in energy metabolism.
- water - soluble vitamins can be lost in cooking.

Thiamine or Vitamin B1

- functions : is an enzyme in CHO metabolism and in growth, important in normal function of nerve tissue (deficiency disease beri-beri).
- sugar → pyruvic acid →
energy plus H₂O
- sources are wheat germ, whole wheat, egg yolk, loin pork, vegetables and fruits.

Riboflavin or Vitamin B2

- function: essential in energy metabolism, prevention of corneal vascularization (non-specific), prevention of cheilosis (non-specific).
- sources are milk and liver.

Niacin or Nicotinic acid:

- function in energy metabolism.
- deficiency results in pellagra.
- sources are liver, pork, beef and salmon.

Vitamin C (ascorbic Acid)

- functions: necessary in formation of bones and teeth, the maintenance of impermeable structure of capillary walls, the formation of connective tissue.
- deficiency disease scurvy.
- sources are oranges, grapefruit, lemons, tomatoes, green vegetables.
- frozen foods and canned foods.

Vitamin D - antirachitic factor

- functions: to regulate the Ca level in the blood and promote Ca absorption.
- Ca: P =1:1, vitamins C and D necessary for bone formation.
- provitamin D (food factor) $\rightarrow$ body $\rightarrow$ skin $\xrightarrow[\text{activation}]{\text{sunlight}}$ vitamin D.
- sources are cod-liver oil, halibut-liver oil.

ALORIES IN THE DIET

- calories defined.
- caloric requirement (energy needs) of an individual vary with age, sex, body size, external temperature, activity, functioning of the thyroid gland, (hypothyroidism and hyperthyroidism)

- examples of individual caloric requirements:
- moderately active man weighing approx. 154 lbs. requires 3000 calories per day.
- moderately active woman weighing approx. 123 lbs. requires 2500 calories per day.

6. FOOD FACTS:

- home canning, manufacturers canning, botulism.
- refrigeration, freezing.
- open storage, oxygenation.
- cooking.
- emotional disturbances
- reduce CHO intake, limit to meal time.

7. DIET RECOMMENDED

- recommended dietary allowances.
- Canada's Food Rules based on recommended daily allowances.
- Composition of some common foods.
- Qualitative diet analysis:

QUALITATIVE DIET ANALYSIS

oods in Diet

Day

		1	2	3	4	5	6	7
Milk	(8 oz. glasses - as beverage)							
	Cheese							
Fruit	Citrus							
	Other							
Vegetables	Potato							
	Yellow and Green							
Cereal	Refined							
	Whole							
Bread	White							
	Brown							
Protein	Meat, Fish, Poultry							
	Eggs							
Fats	Butter							
	Cod Liver Oil							
Sweets	Sugar							
	Candy							
	Cake, Cookies							
	Jams, honey, etc.							
	Pie, sweet desserts							
	Miscellaneous sweets							

[illegible]

Food	Approximate Measure	Wt. Gm.	Cal-ories	Prot. Gm.	Fat Gm.	Carbo- hydrate Gm.	Ca Gm.	P. Gm.	Fe Mg.	Vit.A. I.U.	Ascor- bic Acid Mg.	Thia- mine Mg.	Ribo- flavin Mg.	Nia- cin Mg.

Cereal products

Whole grain and enriched	1/2 c. cooked cereal and cereal products (20 Gm. dry); 1/2-1c. prep. cereal (20 Gm.); 3 soda crackers (20 Gm.); 1-1/2 c. popcorn (20 Gm.); 1 griddle cake (4in. diam.)	80	2.5	1	15	.01	.02	.2	-	-	.02	.02	.3
	1 sl. bread (30 Gm.); 1/2												

c. cooked cereal (20 Gm. dry); 1/2-1 c. prepared cereal (20 Gm.); 2 graham crackers (20 Gm.)	80	2.5	1	15	.02	.03	.6	-	-	.07	.04	.6
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Fowl, cooked	1 medium serving	75	240	19.0	18	-	.01	.15	2.3	-	-	.07	.17	3.7
	1 medium serving	75	150	15.0	10	-	.01	.16	1.7	-	-	.04	.08	5.2
Luncheon meats	1 small serving	60	125	14.0	5	6	.01	.29	4.7	32100	19	.16	2.38	8.9
	2 sl. sausage minced													

ham dried beef lunch-													
eon roll (30 Gm.);													
1/2 frankfurter	85	6.0	7	-	.01	.05	.9	-	-	.08	.08	.8	

Egg	1 medium serving	75	55	13.5	-	-	.01	.15	.4	-	1	.04	.06	1.6
	1 medium	50	80	6.5	6	-	.03	.10	1.4	570	-	.05	.14	.1

Recommended Daily Allowance:			
	<u>Moderately active man, 154 lbs.</u>	<u>Moderately active woman, 123 lbs.</u>	<u>Child 10 - 12 years, 75 lbs.</u>
Calories	3,000	2,500	2,500
Protein	70	60	70
Fat	35% cal.	35% cal.	35% cal.
CHO	50% cal.	50% cal.	50% cal.
Cal.	0.8	0.8	1.2
P	0.7	0.6	1.0
Fe	12	12	12
Vitamin A	5,000	5,000	4,500
Thiamine	1.5	1.2	1.2
Riboflavin	2.0	1.6	1.6
Niacin	15	12	12
Ascorbic Acid	75	70	75
Vitamin D	-	-	400

8. TOOTHBRUSHING TECHNIQUE

- "The human mouth needs more care than any other part of the body. It is habitually unclean and more often diseased than any other bodily tissue or organs".
- measures designed to minimize dental disease and to improve the cleanliness of the mouth are known as oral hygiene.
- why of toothbrushing - to clean the teeth, to stimulate the gingival tissues.
- when to brush your teeth - immediately after eating.
- how to brush your teeth - type of toothbrush, size of head of brush, how to hold the toothbrush, method and systematic procedure.
- care of the toothbrush
- dentifrice and mouthwash
- interdental stimulator and sim-u-dents

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3. Oral Hygiene - Russell W. Bunting, 3rd edition.
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QUESTIONS AND ANSWERS

1. What is a Nutrient? List the nutrients essential for the growth, maintenance and repair of the human body.

A nutrient is a nourishing substance.

Essential Nutrients are: (1) Protein, (2) carbohydrates, (3) fats, (4) minerals - calcium, phosphorous, sodium, potassium, chloride, magnesium, sulfur, iodine, iron, copper and manganese, (5) vitamins - A, riboflavin, niacin, thiamine, C and D.

2. State the ways in which nutrition affects the dental structures.

- (1) growth and development of teeth, jaws and adjacent soft tissues.
- (2) dental-caries activity and control.
- (3) prevention and control of dental disease.

3. Complete the qualitative diet analysis for yourself. Use Canada's Food Rules as a basis, prepare a sample diet for the three daily meals which would improve any deficiencies in your present diet.

Sample Diet

Breakfast: 1 - 4oz. glass orange juice; 1 8 oz. glass milk
1 serving oatmeal with milk
1 slice bread white enriched with butter
1 egg

Lunch: 2 slices bread whole wheat with butter
1 cu. in. cheese
2 pieces celery
1 8 oz. glass milk

Dinner: 1 serving meat
 1 small potato
 1 serving green beans
 1 slice bread (if desired)
 1 serving canned peaches
 Beverage

When should you brush your teeth?

The teeth should be brushed within 5 to 10 minutes after eating any foods.

GLOSSARY OF TERMS

absorption	the passage of substances through the wall of the digestive tract into the blood stream.
calorie	the amount of heat required to raise the temperature of 1 kilogram of water from 0° to 1°C .
dental caries	a progressive lesion of the calcified tissues of the teeth.
diet	the customary daily allowance of food and drink taken by any person; also, food and drink prescribed, as to kind and amount, for therapeutic or other purposes.
digestion	the splitting of food substances into smaller molecules which can be absorbed into the blood.
malnutrition	poor nutrition from imperfect assimilation or lack of essential food.
metabolism	the sum total of the physical and chemical processes by which simpler compounds are converted into living, organised substances.
nutrient	a nourishing substance, or food.
nutrition	the sum of the processes concerned in growth, maintenance and repair of the living body as a whole or of its constituent parts.
periodontium	investing and supporting tissues around a tooth; periodontal membrane, gingiva and alveolar bone.
periodontal disease	disease affecting the periodontium.

ORTHODONTICS - DERIVATION - from the Greek "orthos" meaning straight and "odous" meaning tooth. Literally then Orthodontics should mean "straightening of the teeth".

PRESENT DAY DEFINITION OF ORTHODONTICS

Orthodontics is defined as that branch of dental science and arts which deals with the recognition, prevention and treatment of conditions involving irregularities of the teeth, jaws and face. Such irregularities can markedly influence the physical and mental well being of the individual. The majority of orthodontic patients are children since it is during the growth and development of the individual that the greatest benefits from orthodontic treatment can be attained.

WHY ORTHODONTIC TREATMENT ?

3 Main Reasons

1. APPEARANCE

This seems to rank first in the minds of the layman. Each of us as an individual wishes acceptance in society as being normal in appearance. A pleasing looking face with pleasing looking mouth and teeth may prove of inestimable value in the future of any individual both sociologically and psychologically. Acceptance as normal may not be achieved if marked abnormalities of facial or dental nature exist. One of the aims of orthodontics is to produce an esthetic result as near to normal as is possible under various limitations dictated by Nature.

2. FUNCTION OF ORAL STRUCTURES

Nature has dictated a "normal" arrangement and appearance of teeth in which each tooth occludes correctly with the rest so that the strains of biting pressures are equally distributed through the mouth, and maximum tooth to tooth contact is achieved. Maximum contact assures the patient of a chewing system by which foods can be properly masticated prior to entering the stomach. Good functioning position of a maximum number of teeth has been found to decrease the likelihood of periodontal disease in later life. Orthodontic treatment aims to place a maximum number of teeth in positions of optimum efficiency.

3. HEALTH OF ORAL STRUCTURES

It is frequently difficult for even very conscientious patients to adequately cleanse the mouth of all food debris around irregular teeth. Retention of debris promotes dental caries and periodontal disease. Correction of irregularities allows improved oral hygiene and subsequent reduction in decay rate and improved health of periodontal tissues. Improper function of teeth because of irregularities in their position contributes to breakdown

of the periodontal tissues. In all, teeth in regular alignment and their supporting structures should in time prove healthier than if irregularities existed.

SPECIFIC AIMS OF ORTHODONTICS

1. To improve, if possible and necessary, the facial esthetics of a patient to the extent that it is influenced by the component parts of the cranio facial complex.
2. To eliminate factors that may disrupt the normal growth and development of the cranio-facial complex.
3. To maintain or establish (in so far as is possible) a normal functioning occlusion of the dentition.
4. To observe and correct conditions that fall within the field of preventative orthodontics.
5. To serve with oral and plastic surgeons as a part of a team in the rehabilitation of severe oral and facial deformities.

OCCLUSION AND MALOCCLUSION

Occlusion is the term used to designate the contact relationship of the lower teeth with the upper teeth.

Malocclusion is the term used to designate deviation from normal occlusion. Normal occlusion is the ideal intended by Nature. In normal occlusion all the teeth of both dental arches are in maximum contact. Centric occlusion is that position when the teeth are in maximum contact and the jaws themselves in normal functioning relationship.

Classification of Malocclusion

Neutroclusion (Angle Class I) - normal relation of upper and lower first permanent molars, i. e. the mesio-buccal cusp of the upper molar occludes (bites) in the buccal groove of the lower molar, - however other dental irregularities are present within the arches. Facial profile is usually basically straight (mesognathic).

Distocclusion (Angle Class II) - upper first molar occludes one cusp (more or less) forward of the lower first molar or vice versa. There are two divisions of Class II malocclusion: Division I - in which the upper anterior teeth all seemingly protrude; Division II in which the upper central incisors are over-ventral and the lateral incisors protrude. In Division I the facial profile is often convex - the mandible may be short resulting in an "underslung"

lower jaw appearance (retrognathic). In Division II the profile is frequently relatively normal.

Mesioocclusion (Angle Class III) - basically the lower first molar occludes forward of the upper first molar. The mandible is often prominent and the maxilla retarded, resulting in a "bull dog" chin profile (prognathic).

Common Procedures in Conduct of Orthodontic Practice

1. At initial examination of the patient all history pertinent to the problem is recorded. Includes data regarding hereditary background and environmental background of the malocclusion, of local nature (facial area) and of systemic nature (general bodily development).
2. At initial examination the general nature of the existing malocclusion is usually recorded as well as dental history related to it, and facial development and facial function problems related to the malocclusion.
3. At a subsequent appointment diagnostic aids are commonly procured.
 - (a) Plaster study models made from alginate impressions of the upper and lower dental arches. These permit detailed observation of the position of teeth within the arches.
 - (b) Radiographs
 - (1) Intra-oral X-rays: usually a complete mouth survey - to disclose pathologic conditions of teeth and surrounding structures; presence or absence of teeth; quality of supporting bone; information re root structure; positions of unerupted teeth; etc.
 - (2) Extra-oral X-rays: cephalometric radiographs commonly called head plates. Are commonly used to assess abnormal bone growth and tooth positions thus aiding the orthodontist in determining corrective procedures to follow to achieve more normal relations for the patient.
 - (3) Temporo-mandibular joint X-rays - may be advisable to determine the cause for unnatural mandibular movements or joint discomfort.

Photographs

Extra-oral face and profile pictures are useful in the patient's absence to study abnormalities of facial and dental appearance and to correlate these findings with those determined from model and X-ray analyses. Intra-oral colour films are useful additional "before and after" records. Before and after photographs of completed patients are valuable aids to patient visual education in illustration of the values of orthodontic treatment.

Etiology

Analysis of the history and diagnostic aids leads to the determination of the causes of the malocclusion - the Etiology. Causes of malocclusion may be quite evident or rather obscure. It is important that as much as possible the etiology be determined since if the causes cannot be eliminated or alleviated successful treatment could prove to be impossible to achieve.

Etiology in orthodontics may be divided into three general categories:

1. Hereditary patterns

There is evidence to indicate that many malocclusions are inherited either in abnormal jaw growth or tooth positions e. g. the child may display an undersized mandible similar to one of the parents.

2. Systemic Influence

Infectious disease, nutritional deficiencies, etc. may markedly interfere with abnormal bone growth e. g. to the extent that jaw size may be inadequate to hold the teeth without crowding occurring.

3. Local factors - examples:

Early or delayed loss of deciduous teeth; early or late eruption of permanent teeth; loss of permanent teeth due to caries or other pathoses; congenitally absent teeth; additional teeth; oro-facial habits such as thumb-sucking, tongue thrust, mouth breathing, lip sucking, etc., abnormal facial muscle function.

Diagnosis

The art of determining what is wrong is termed diagnosis. This results from the analyses of the history, present conditions and etiology. In orthodontics the diagnosis determines what malocclusion exists and if possible why it exists.

Malocclusions may be of skeletal nature i. e. abnormalities of bone growth and development; they may be of dental nature i. e. abnormal tooth positions; or they may be combinations of both factors. Marked abnormalities of teeth and facial nature may be of congenital defect origin e. g. cleft palate and lip.

Some Common Orthodontic Problems

Cross-bite may be anterior or posterior in which opposing teeth occlude too far inside or outside one another.

Protruding upper anterior teeth - often a Class II Division 1 malocclusion - however anterior protrusion may exist while the posterior occlusion is normal.

Open Bite - may be anterior or posterior in which opposing teeth do not contact - often due to finger or tongue habit pressure.

Crowded and rotated teeth - may range from severe to minor, anterior or posterior. Frequently due to disharmony between tooth and jaw sizes or due to abnormal muscular pressure on the teeth.

The above examples of malocclusions may be found individually only in a patient but combinations of many forms of malocclusion may be found in an individual case.

PREVENTIVE ORTHODONTICS

This implies the application of any dental procedures that are necessary to maintain the health of the teeth and surrounding tissues and maintain normal occlusion. Education of the patients and parents in care of primary and permanent teeth is most important. Preventive orthodontics includes good restorative dentistry, space maintenance if necessary, careful attention to the time of the loss of the deciduous teeth and to over retention of deciduous teeth.

ORTHODONTIC APPLIANCES

There are 2 main types of appliances used to reposition teeth and influence jaw growth - removable appliances and non-removable or fixed appliances.

Removable Appliances - are usually constructed of acrylic with metal clasps fitting about some teeth to hold the appliance in place. These appliances usually contain fine wire springs to move the teeth.

Fixed Appliances - one or more bands are cemented to the teeth to which are attached various wires to move the teeth. These appliances vary in their complexity.

Frequently used auxiliaries to both types of appliances are elastic bands attached by the patient according to specific instructions, and extra-oral appliances commonly referred to as "head gear".

CONDUCT OF AN ORTHODONTIC PRACTISE

The complexity of treatment required varies as to the complexity of the problem. The complexity of the appliance used and the length of treatment are usually in proportion to the complexity of the case. If major treatment is

required the first few appointments are usually lengthy perhaps two to three hours in length for fabrication and placement of appliances. The patient is then usually seen at two to four week intervals for adjustment of the appliances. Major treatment may require two to three years of treatment. Active treatment is followed by retention period of indefinite length during which time the patient usually wears a plastic "retainer" plate to maintain the teeth in their corrected positions.

The relationship between patient, parents, dental assistant and orthodontist is much more intimate in an Orthodontic practise than in general practise due to the frequency of appointments. This frequency of contact affords the office personnel of the opportunity to be rather influential in the field of patient education. It also requires that the office personnel develop better than average ability in the psychology of patient and parent management. The loss of school time due to frequent appointments may promote disharmony between patients and office and necessitates tact and diplomacy to promote more harmonious relationships. The success of orthodontic treatment is greatly dependent upon patient co-operation and every effort must be made to maintain harmony between office, patient and parent so this co-operation is maintained.

THE ROLE OF THE DENTAL ASSISTANT IN ORTHODONTIC PRACTISE

The points enumerated here are particularly specific to orthodontic practise. Other general duties in a dental practise will have been covered by other lecturers.

1. Appointment Control - as mentioned previously the orthodontic assistant must develop tact and diplomacy to placate patients or parents irritated by the frequency of appointments and loss of school time. She must develop a working knowledge of appointment time required so that undue explanation by Orthodontist is not frequently required.
2. Instruct patients and parents in treatment procedures such as use of elastics and other auxiliaries thus providing the Orthodontist with more productive chair time.
3. Aid the Orthodontist in construction of appliances (if required). An Orthodontist practising without a full time technician may require assistance in band fabrication. The operation of an electric spot welder is relatively simple and the orthodontic assistant may be called upon to weld bands. Assistance may also be given in the construction of acrylic appliances or in the pouring and trimming of plaster study models.
4. Mixing of impression material for Orthodontic impressions.

5. Mixing of cement for cementation of bands. Placement of cement in bands prior to the doctor actually placing the bands on the teeth.

QUESTIONS AND ANSWERS

1. What is Orthodontics?

Orthodontics is the branch of dentistry which deals with the recognition, prevention and treatment of conditions involving irregularities of the teeth, jaws and face.

2. What are the reasons for Orthodontic treatment?
Briefly explain the advantages.

Appearance, Function of Oral Structures, Health of Oral Structures.

Orthodontic treatment aids in the production of normal appearance. A pleasing looking face, mouth and teeth may be of inestimable value to the individual's future both sociologically and psychologically.

When teeth are in positions of normal function there is less likelihood of caries and periodontal disease. Maximum contact of teeth in normal function aids chewing of food and indirectly aids digestion.

The Health of the Oral Structures is usually enhanced by teeth in regular alignment and function in that the patient is able to practice better oral hygiene and there is less likelihood of periodontal disease in mouths of good function.

3. Crowded and rotated teeth are frequent in malocclusion.
Give three reasons why this can occur.

1. Disharmony of tooth and jaw size.
2. Abnormalities of facial muscular function.
3. Hereditary influence.

First Aid - Trained persons giving skilled assistance to: -

Preserve Life
Promote Recovery
Prevent Further Aggravation

The First Aider must make a DIAGNOSIS of the case; to do this, consider the:

signs - variations from a normal condition such as pallor,
swelling, an obvious break, etc.

symptoms -
sensations felt by the patient, pain, cold, heat, nausea
etc. These can be obtained only if the patient is
conscious.

history -
the story of how the accident or illness occurred..
Obtained from the patient if conscious, or from by -
standers.

The signs are the most reliable, but the history and symptoms
can be of great help in making a diagnosis.

Having made a diagnosis, go on to the TREATMENT of the case.

If the cause of the condition is still active, remove the cause if
possible, e.g. log of wood on leg, or remove the casualty from
the cause of the condition, e.g. gas filled room. Apply such
treatment as required paying particular attention to - failure
of breathing - severe bleeding - shock.

Recognising and treating the following conditions: -

1. Asphyxia - (Lack of sufficient pure air)

When the lungs do not get an adequate supply of fresh air, vital
organs and the important nerve centres in the brain which
regulate their activity are deprived of oxygen and this causes
the dangerous condition called asphyxia. Unless the cause
is speedily removed and the supply of oxygen restored to the
blood circulating through the lungs, loss of consciousness, cessation
of breathing, failure of circulation and death will result.

Causes of Asphyxia:

- Fluid in the air passages as in drowning.
- Harmful gases.
- Foreign bodies in air passages - portions of food, false teeth, etc.
- Compression of the wind pipe as in hanging.
- Smothering.
- Electric Shock.
- Poisons, e.g. prussic acid and morphine.

Signs and Symptoms:

<u>Early Stages</u>	<u>Later Stages</u>
Shortness of breath	Breathing intermittent or absent
Rapid Pulse	Pulse slow and irregular
Partial loss of consciousness	Complete loss of consciousness
Dizzy and weak	
Congestion of face with blueness of cheeks and lips.	Lips, nose, ears and fingers are bluish-grey

Treatment:

- Remove the cause if possible, or the patient from the cause.
- Ensure free air passage and fresh air (keep crowds back) check the mouth and tongue.
- Loosen tight clothing about chest, neck and waist.
- Begin artificial respiration immediately.
- Practical demonstration of "Holger Neilson" method.

11. Haemorrhage

To be able to arrest severe bleeding one must have some understanding of the circulatory system: -

The Heart is a double muscular pump which contracts in the average adult, at the rate of 72 times per minute. (thus giving a pulse rate of approximately 72 per minute).

Blood leaves the heart and enters the lungs to be purified (takes on oxygen and gives off impure gases). From the lungs the now pure blood re-enters the heart and leaves it again through the aorta which divides to become arteries. The arteries carry the pure blood throughout the system: they become smaller and smaller until they become capillaries. These capillaries allow the passage of fluids and the diffusion of gases to and from the tissue cells. Veins are formed by the joining up of the capillaries and the veins carry the impure blood back to the heart.

TYPES OF WOUNDS

Incised - clean cut
Lacerated - torn edges
Contused - associated with bruising
Punctured - often a small opening
but may penetrate deeply.

TREATMENT

Place patient in a suitable position,
preferably lying down.

Expose the wound.
Do not disturb clots.
Remove foreign bodies that can be
easily removed.
Apply and maintain pressure.

(a) Direct Pressure. Use thumbs, fingers or palm of hand over a pad if available, to the part of the wound from which the blood is coming. As soon as possible apply direct pressure by means of a bandage.

(b) Indirect Pressure:

- (i) Using thumbs apply pressure to pressure points.
- (ii) Using a bandage as a constriction.

(c) Pressure Points.

- Carotid - stop bleeding in the head.
- Subclavian - stop bleeding between neck and shoulder.
- Brachial - stop bleeding in the arm.
- Femoral - stop bleeding in the leg.

Constrictive bandage:

If necessary to maintain direct pressure for more than a short period of time, apply the constrictive bandage around the limb on the side of the wound nearer the heart (between the wound and the heart)

QUESTIONS ON LECTURE #1

1. Describe First Aid?
2. What is the most help in making a diagnosis, and why?
3. Describe Asphyxia?
4. What are some of the common causes of asphyxia?
5. What is the treatment for Asphyxia?
6. What are some types of wounds? Describe them?
7. What are the methods of controlling haemorrhage?
8. Where is it most practical to apply a constrictive bandage and why?

Recognizing and treating the following conditions.

111. Shock - is a condition of severe depression of the vital functions.

It is associated with changes in the circulatory system varying from temporary weakness to complete failure. Loss of whole blood or plasma is the most important cause of shock.

Shock is a common cause of death following severe injuries.

Types: - Nerve Shock
 Established Shock

Signs and Symptoms - may vary from faintness to collapse, with: -

Giddiness and faintness
Coldness
Nausea
Pallor
Cold clammy skin
Slow pulse becoming progressively
more rapid and feeble

Vomiting
Unconsciousness.

Nerve Shock: - may not involve injury but is caused entirely by nervous factors. There is a drastic drop in blood pressure but this need not be associated with any reduction in blood volume.

Established Shock: - is associated with major injuries and severe bleeding whether it be concealed or not concealed.

Treatment:-

Reassure the casualty.

Lay patient down on his back with head turned to one side (unless otherwise indicated by head injuries). If breathing is interfered with (vomiting etc.) use a three quarter prone position.

Loosen tight clothing.

Keep patient warm but do not overheat.

If thirsty give sips of tea, coffee or water.

Special - in cases of severe injury (established shock) the patient may require an anaesthetic, so give nothing by mouth.

Remove to hospital quickly.

V. Insensibility

Unconsciousness is due to an interruption in the action of the brain through some interference with the functions of the nervous system.

There are two degrees of insensibility apart from sleep:-

Partial (stupor)

Complete (coma)

Common Causes: -

Shock

Asphyxia

Poisoning

Apoplexy

Hysteria

Diabetes

Heart Attacks

Treatment:

Ensure plenty of fresh air

If necessary, apply artificial respiration

If breathing is noisy, turn patient into three quarters prone position with head on one side.

Give nothing by mouth while unconscious

Apply the special treatment for the condition that has caused the unconsciousness.

QUESTIONS

1. What is shock? What types are there?
2. What are some of the signs and symptoms of shock?
3. What is very important in the special treatment of established shock?
4. How many degrees of insensibility are there, and what are they?
5. What are some of the causes of insensibility?
6. What is the treatment for insensibility?

Pathology - phase of biology
 - deals with cause and mechanism of disease

All living organisms are composed of cells, inter-cellular substance, and fluids. These are in various forms and combinations to make up different tissues, organs and systems.

Under optimum conditions these cells respond to their environmental stimuli, to the benefit of the living organism. The result is what we call health.

Disease, on the other hand, is the response of cells to unfavourable stimuli, irritations, or injuries. Pathology is the study of disease. Dental or oral pathology is the study of disease in and about the oral cavity.

All cells are inter-related with other cells of the body because of the fluid media in which they exist. Each individual cell is composed largely of fluid and is bathed in fluid.

The wall of the cell and adjacent capillary loops are permeable, permitting fluid elements (carrying nutrients and oxygen) to pass out from the capillary, diffuse through the inter-cellular substance, and enter the cell, deposit the nutrient, pick up the waste, diffuse through the cell and be picked up again by the circulatory system.

This interchange between bloodstream and tissue fluid permits hormones and enzymes produced by one group of cells to be transported to other areas of the body where their effect may be felt.

Thus it is through this fluid medium and circulatory system that a single organ may influence all of the cells of the body.

When a cell dies it decomposes and is removed by large wandering cells, called monocytes or macrophages. The cell is replaced by a new one formed from cell division (mitosis) of the remaining cells so any tissue may be made up of cells of varying ages.

As the organism ages the process of maintaining suitable living conditions within the fluid environment becomes increasingly difficult because the inter-cellular substance seems to deteriorate with age (less permeable) and is not efficiently or effectively replaced. The cells react more slowly and less effectively and the rate of cell breakdown begins to exceed the rate of repair. This is basically the aging progress to which all living things are subject.

Disease may be produced by a wide variety of causes which are sometimes divided into 3 groups

1. Intrinsic Factors

2. Extrinsic Factors

3. Developmental Factors

1. INTRINSIC CAUSATIVE FACTORS - these are factors which are contained within the chromosomes of the sex cells and are called genes. Certain disease entities are transmitted from one generation to another in this fashion. For example, colour blindness and haemophilia (carried in the chromosomes which dictate a child will be male); absence of parts e.g. teeth missing; certain types of insanity etc. Disturbances in the formation of enamel (amelogenesis imperfecta) and in the formation of dentine (dentinogenesis imperfecta) are dominant hereditary conditions.

People also inherit tendencies to develop specific diseases e.g. tuberculosis, diabetes, gout.

2. EXTRINSIC CAUSATIVE FACTORS - are factors which affect cells as a result of being brought to the cells from their external environment, rather than being transmitted through chromosomes.

These, of course, are numerous and include such things as oxygen lack, excess heat, excess cold, food, physical and chemical traumas, irradiation, micro-organisms and psychological alterations.

We all know that oxygen is necessary to human life. If the body is deprived of oxygen for a short time death results e.g. during drowning, suffocation (cave in) or asphyxiation (carbon monoxide poisoning). Also, however cells of a limited area may die because of lack of oxygen if a blood vessel to an area becomes obstructed. Obstruction of a vessel may occur as a result of thrombosis or embolism. Thrombosis refers to the intravascular solidification or coagulation of something in the blood. Usually it refers to a clot within a vessel. This clot is called a thrombus.

Embolism is the transportation of a substance or mass through vessels from one location to a second. This mass is called an embolus. Most emboli are thrombi which have become detached. Air bubbles or clumps of bacteria are other possible emboli.

Thrombosis is of significance because of the possibility of occluding the vessels of vital tissues and organs e.g. brain or heart causing death of a large or small area of tissue which in turn may cause death of the patient.

Heat and Cold - Extremes of temperature both heat or cold produce tissue injury.

Mild heat or cold applied to skin results in slight stimulation of circulation (i.e. gives slight redness) and for this reason heat and/or cold may have

therapeutic value.

Intense heat produces accumulation of fluid within the tissue, beneath the skin and results in blister production. More intense heat coagulates cellular cytoplasm or actually chars tissue.

Intense cold causes restricted circulation in the exposed area; ice crystals may form within the tissue, which on thawing cause blisters. If the temperature is so low within an area that blood flow stops, the blood clots and normal flow will not be returned when temperature is returned to normal, so death of the part occurs - gangrene results.

Water - as an intrinsic cause of disease is related to too much or too little for body requirements. Too much water is unlikely. Too little water leads to dehydration. This may occur during vomiting and/or diarrhea where large amounts of fluid are being lost. This is particularly significant in children or elderly people.

Food - will be discussed with you by other people. Suffice to say that too much or too little food has a damaging effect on the body. Too much or too little of various food fractions - vitamins, minerals, fats, carbohydrates or proteins cause specific problems e.g. rickets, vitamin D. lack.

Mechanical Injury - is a common cause of tissue damage. Its effect depends upon the site of application, the intensity and method of application. We speak of physical injury as trauma and this can occur as a result of dental procedures or be of such a nature that dental surgical procedures are required to repair the damage.

Abrasion - scrape

Laceration - tear-jagged

Incision - knife

Penetrating - bullet

Contusion - bruise

Fracture - bone break

Chemical Injury - may be a burn (at point of chemical application) or may enter the body and be carried to other parts of the body and may poison cells. Chemical burns may be produced from dental drugs such as phenol, silver nitrate, antiformin.

They may produce redness, blisters or ulcers depending upon the concentration of the chemical, its toxicity and the length of time applied.

Toxic substances may enter the body by ingestion (eating), injection (snake or insect bite), absorption (lead) or inhalation (carbon dioxide). This may be called poisoning.

Radiation Injury - most common form is sunburn

may be simple redness or worse with blisters and peeling. Repeated small dosages produce an increase in skin pigment - tan - which protects the skin. Excess sunshine can contribute to skin cancer.

X-Ray Radiation - can produce tissue damage. Repeated exposure tends to be cumulative and to build up. Small dosages used infrequently (e. g. dental X-Rays) are not damaging, but people who work in the presence of an X-Ray machine must take precautions to avoid repeated exposure. X-Ray radiation is more potent than ultra violet radiation. Large dosages produce redness, swelling, loss of hair. If exposure is discontinued healing will occur. However, if radiation is more intense or repeated over long periods cells are destroyed and an open sore can result. Permanent damage includes scarring, sores which do not heal, cancer, sterilization, etc.

Radioactive materials produce similar problems (uranium). Electricity may produce burns where it touches the body and/or produce paralysis of respiratory centre and death results.

Micro-organisms - one of the commonest extrinsic causes of disease - to be discussed under Bacteriology.

Psychological Factors - Various emotional stresses can produce abnormal patterns of behaviour which we speak of as mental disease. This can also be produced by impairment of brain tissues.

Stress may also produce endocrine dysfunction which results in various tissue alterations. Such diseases are said to have a psychosomatic factor, e. g. peptic ulcer, various skin conditions, backaches, headaches, bronchial spasm (asthma), hiccups, migraine, menstrual disturbances, nervousness and fatigue.

3. DEVELOPMENTAL FACTORS - The third general category of factors which produce disease (Internal, External, Developmental).

Disease may result from a disturbance in the development of a tissue or a part of the body. If some of the cells of a developing tissue are injured further development may be limited, resulting in an abnormal or defective tissue. Examples of this include disturbances in number, position, size, shape, eruption or structure of teeth.

Number - all or some of the teeth may fail to develop (P. 159) anodontia - implies lack of tooth development. This lack of teeth is particularly common with upper lateral incisors, first bicuspid and third molars.

Supernumerary - extra teeth may form. These are most commonly upper incisors or molars. Supernumeraries are usually abnormal in size and shape and may or may not erupt. They may deflect other teeth into abnormal positions. Early eruption of teeth is occasionally associated with hyperfunction of pituitary or thyroid glands. Delayed eruption involve all or part of the dentition. Frequently generalized delayed eruption is due to delay in general growth. (see Page 160).

Disturbances in position of teeth may be due to insufficient space in the arch resulting in crowding. This in turn may be due to large teeth in a small arch or due to lack of growth in the jaw. (at least part of which is due to lack of functional stimulations during the growth period).

Dilaceration - long axis of crown and root are not in the same plane. Usually due to crowding during development or a blow which displaced the crown when the root was beginning to form.

Dens in dente - tooth within a tooth - abnormal development due to invagination of the enamel into the area of a natural pit or groove. Most often seen in maxillary lateral incisors - lingual pit. May be in only a short distance or may extend to apex of root. Radiographically looks like tooth within a tooth.

Enamel Hypoplasia - Page 157 - The Dental Assistant - adequate description. Common causes of hypoplasia are high fever, infectious diseases, characterized by a rash (measles, chicken pox) dietary deficiencies, irradiation, local infection, and ingestion of toxic substances.

Hutchison's Teeth - (Page 158) - a form of congenital hypoplasia frequently seen in mouths of patients who have a history of congenital syphilis. Central incisors usually involved.

Mottled Enamel or Fluorosis - (page 158) a particular type of hypoplasia - teeth are relatively caries immune. Textbook description adequate.

Hereditary Opalescent Dentine or dentinogenesis imperfecta and Amelogenesis Imperfecta are both dominant hereditary conditions as mentioned during intrinsic causes of disease. In each case the enamel or dentine is poorly formed in all of the teeth, although the severity of the defect varies widely in different patients. Page 159 adequately describes opalescent dentine.

Amelogenesis Imperfecta - results in great variation in enamel formation, from lack of it giving yellowish teeth to chalky yellow enamel, to some normal areas and some chalky areas.

Concrescence is union of two teeth by cementum. It most frequently occurs in maxillary molar region, between second and third molars, when the 3rd molar is in an unusual position. An excess deposition of cementum cements the two teeth together. This complicates extraction of either tooth and is not usually discernable by X-ray.

Geminism - occurs during development when a single tooth germ (enamel organ) partially divides to form a tooth with two crowns and root. Sometimes this only shows as a deep notch in the crown.

Fusion is a malformation produced by union of two developing adjacent teeth. It is most frequent when a normal tooth fuses with a supernumerary. X-Rays show a double root - two root canals.

Harelip and Cleft Palate (Page 160)

Clefts result from failure of fusion of any of the facial processes. The most common clefts involve the upper lip and palate region. The lower jaw is rarely affected.

The cleft may involve the lip alone, the lip and palate, or the palate alone. The lip cleft may be to one side of midline (unilateral) or both sides. When the cleft is on both sides it resembles the lip of a rabbit. Hence the name Hare-Lip.

The cause is not definitely established, it may include heredity, nutrition of the foetus or mechanical interference.

Infants born with this cleft palate and hare-lip are unable to suckle well and are difficult to feed. Food gets up into the nose and is aspirated into the lungs resulting in infection. The condition is usually treated surgically and very early (3 months - lip) (18 months - palate).

REACTION OF TISSUES TO INJURIES

Inflammation: is a non-specific reaction of tissue to injury which may be caused by mechanical, thermal, electrical, chemical or bacterial agents.

Inflammation is a defensive mechanism on the part of the body, to wall off and eliminate the diseased area and replace it with healthy tissue.

The presence of inflammation is designated by the suffix "itis" attached to an anatomical designation of the part injured - e.g. appendicitis, tonsillitis, gingivitis.

The response of the body to injury is a very complex one and consists of an alteration of blood vessels, the mobilization of the cells of defence, the

action of chemical substances and the formation of new tissues.

When a tissue is injured it liberates a substance which sets the inflammatory process in action.

- First — vessels constrict for 20-30 seconds.
- then dilate until they are larger than before.
 - more capillaries come into use.
 - much more blood in the area but travelling more slowly.
 - white cells line up along walls of vessels (margination)
 - vessels become more permeable.
 - excess fluid escapes out into tissue (edema).
 - white cells also pass out through fenestrations (call this process diapedesis).
 - fluid from circulatory system also accumulates in the inter-cellular spaces.

These changes produce the cardinal signs of inflammation - redness, (rubor), swelling, (tumor), heat, (calor), and pain, (dolor).

The fluids which have accumulated in the tissue spaces contain lysins - which liquify injured cells and bacteria, anti-toxins which neutralize toxins, and agglutinins which causes scattered bacteria to be drawn into clumps for easier destruction.

The escaped blood plasma contains the protein, fibrin, which makes blood clot. This same mechanism makes the fluid which has escaped, clot, i. e. makes a fibrin mesh which entraps and localizes the irritating agent. This makes the swelling hard and firm.

Certain white blood cells congregate in the inflammatory area, apparently drawn by something chemical which is being produced at the site of injury.

- | | | |
|----|---|--------------|
| 1. | neutrophils (polymor phonuclear leucocytes) | |
| 2. | monocytes |) phagocytes |
| 3. | macrophages |) |

Later in the infection hymphocytes gather. These are in some way related to antibody production.

All of these cells ingest and destroy bacteria and foreign material. Enzymes are produced at the site of the battle, which begin to soften and liquify the area and pus is produced, which if close to the surface usually escapes and provides rapid elimination of the dead material.

Repair - This is followed by repair. The blood vessels and living connective tissue around the injured area begin to proliferate and grow into the injured area, slowly displacing any remaining dead tissue.

This new tissue is called granulation tissue. It is soft and vascular. As it matures it becomes harder and less and less vascular. Finally it becomes avascular. It is whitish in colour, mostly connective tissue, and is called scar.

Degeneration refers to those alterations of cells which are due to the action of injurious agents on cells, causing distortion either directly or by upsetting their metabolic processes.

Degeneration is a daily process. As cells age or are used they wear out and must be replaced. This is normal.

Sometimes degenerations occur due to injury to cells during their formative period. An example is enamel hypoplasia e. g. a youngster has a high temperature while a tooth enamel is forming; the ameloblasts work is interfered with, the enamel production is deficient and the result shows in the finished tooth as a line or area of hypoplastic enamel.

Hypoplasia and Hypertrophy - (page 155) is covered adequately in the text book.

Neoplasia - (Page 156) see text plus these notes.

The site of origin of malignancy might be of some interest to you.

		<u>Percent Incidence</u>	
		<u>Male</u>	<u>Female</u>
<u>Site of origin</u>	Mouth	6%	3%
	Respiratory	12%	2.5%
	Digestive	33%	23%
	Genital	11%	24%

Cause of malignant growth is not yet known, but the following factors are among the suspected or proven causes:

Heredity -there is some evidence that cancer runs in families

Mechanical Irritation-e. g. sharp jagged teeth

Chemical Irritation -e. g. coal tar, perhaps some hormones

Radiation -e. g. X-Rays and sunshine

Virus -suspect that some cancers can be transmitted by virus infection.

DENTAL CARIES

Dental caries involves nearly all of the human population but the more primitive peoples have less susceptibility. Historical accounts of dental caries indicate that the disease is as old as recorded history, but has increased as civilization allegedly advances.

e. g. Eskimos out of contact with white man - only 1% of their teeth affected by caries.

Eskimos in contact with white man 18% of teeth affected.

Dental Caries has a complex etiology, which is not fully understood.

Popular Theory: The most widely accepted theory suggests that caries results from a process of demineralization of enamel and dentine by acids, which are formed through bacterial enzymatic degeneration of carbohydrates and the proteolytic destruction of the organic portion of the enamel and dentine by the action of proteolytic micro-organisms.

Acids and Plagues

The decay process is believed to be something like this

1. plaque of mucin form on a tooth in protected areas
2. the plaque thickens and entraps food debris and bacteria
3. organisms in the plaque produce enzymes which ferment the carbohydrates which manufacture acid.
4. acid is held in contact with tooth surface by the plaque
5. plaque prevents saliva from neutralizing or diluting acids
6. acids attack enamel and decalcify it
7. proteolytic organisms attack the organic parts of the tooth.

The rate depends upon the abundance of the plaque, the type and number of organisms, the amount of carbohydrates available and the character (resistance) of the tooth surface.

Factors Affecting Decay Rate

Tooth Surface rough surface retains more debris and plaque fluoride makes enamel less soluble.

Saliva ropey-stickey, due to extra mucin in saliva makes for poor oral hygiene and predisposes towards plaques.

thin or watery, due to less mucin, makes for better oral hygiene.

Tooth Arrangement

position, shape, or contour all effect food retention.

Oral Hygiene

affected by above factors. Regular brushing immediately after meals is very desirable.

Diet

the less refined sugar in the diet the less tooth decay.
soft food has less cleansing effect than hard foods.

Clinically

the most common site for caries is pits and fissures of teeth.
2nd most common is interproximal areas beneath contacts.
3rd cervical caries (neck of the tooth, i. e. at gum line).

PULP DISEASE

Inflammation of the pulp results from:

1. bacterial invasions from caries
2. thermal shock from deep mental restorations
3. chemical shock from cavity medication
4. traumatic shock from a blow on the tooth.

The dental pulp contains vessels and nerves, injury to the pulp results in pulpitis (inflammation of pulp).

This pulpitis can be divided into:

1. Hyperaemia - first stage of inflammation; blood vessels dilate, cold causes pain, which disappears when cold is removed. This may resolve or go on to give a Simple Pulpitis in which some exudate is produced. Part of the pulp may be affected or all of the pulp may be affected. If only a small part of the pulp is affected it may recover. If a large part or all of the pulp is affected then the pulp will die. If bacteria are present we get a suppurative pulpitis. This is characterized by pain, of a severe, boring, gnawing, nature which starts with a sharp intermittent pain, which becomes steady. The pressure increases due to gas formation from the deteriorating pulp. Heat intensifies the pain, cold relieves the pain.

Ulcerative Pulpitis - is the same as suppurative pulpitis but is not as painful because the cavity is open in this case and the gas can escape. Pain occurs if the cavity is stimulated directly. Sometimes the pulp will hypertrophy or overgranulate and will mushroom out of the cavity as a soft blob of tissue which bleeds easily.

Periapical Abscess - Following severe acute pulp disease some of the infected material passes from the pulp chamber down the canal to the apex, provokes an inflammatory response and causes pain and swelling.

Periapical Granuloma - is similar but the inflammation is minimal, not severe, so the body localizes the inflammation to the periapical zone. It usually results from partial slow degeneration of the pulp. It may remain static for years or may suddenly flare up and become acute.

Radicular Cyst - A periapical granuloma of long standing providing that there is epithelium (from cell rests) within it, may begin to grow and form a hollow space lined with epithelium and filled with fluid. It usually grows slowly and replaces the bone, creating a hollow space. Occasionally these cysts become large enough to seriously weaken the jaw and perhaps even lead to an unexpected jaw fracture.

PERIODONTAL DISEASE

is disease which attacks and destroys the tissues which support and hold the tooth in the mouth. Periodontal disease destroys the gingival attachment to the tooth, destroys the periodontal membrane and the alveolar bone.

In children, teenagers and young adults, tooth decay accounts for the greatest cause of tooth loss. In the mid thirties and becoming more important with age periodontal disease takes over and becomes the main reason for tooth loss. This does not mean that periodontal disease starts in the mid thirties. On the contrary it may well start in children, frequently starts in teenagers and is common in young adults. By the age of mid thirty it has usually done sufficient damage to cause the loss of some teeth. The treatment of periodontal disease is one of the most neglected phases of dentistry.

What causes gingival and periodontal disease? All gingival and periodontal disease is actually a resultant between (A) direct or initiating factors which cause injury to the periodontal tissues and (B) modifying or contributing factors which influence the reaction of the tissues to injury.

The initiating factors include

Surface irritants e.g. calculus, debris, bacteria

Faulty dentistry - overhanging fillings, poor contacts

- badly designed bridges and partial dentures

Mouth breathing.

(B) The modifying factors include

1. Occlusal over functions or under function.

When a person chews and the teeth come together the muscle load is distributed over the biting surfaces of the teeth. This load in turn is taken up by the fibres of the periodontal membrane which transfer it to the jaw bone. This is stimulating and necessary for dental health. Any tooth which is over functioning or under functioning transmits either too much stress to the supporting structures and causes damage to them or too little stress to the supporting structure and fails to stimulate them, so they become soft, weak, and susceptible to infection and breakdown.

2. Systemic modifying factors include

1. Hormonal Imbalance - pregnancy -etc.
2. Nutritional deficiencies - vitamin C etc.
3. Metabolic disorders - diabetes, hypothyroidism.
4. Patients resistance, constitution and heredity.

Systemic Factors do not produce periodontal disease but do influence the results of local irritants.

Gingivitis - means inflammation of the gingiva.
- it is very common, gums bleed easily and are red and swollen
- if neglected it may lead to more serious periodontal disease.
- occurs under the influence of local irritants but is modified by pregnancy, puberty, mouth breathing, and certain bacteria - e. g. necrotic gingivitis or trench mouth.

Periodontitis may result from extension of gingival inflammation (gingivitis) into the deeper periodontal tissues. As the inflammation progresses, more and more of the supporting structures of the tooth are destroyed. The tooth becomes loose. The gum tissue separates from the tooth and makes a deep pocket of unattached gum tissue which acts as a catch all for food, debris, and bacteria. Pus may be produced in these pockets and be squeezed out by finger pressure. This is how the name pyorrhea came into being. It means a flow of pus. This condition is highly inflammatory, slowly progressive and usually involves most teeth in the mouth.

There is a second type of periodontal disease; the cause of it is unknown. This is referred to in Canada as necrotic periodontitis and in the U.S.A. as periodontosis. This condition is not well understood. It occurs usually in clean, well cared for mouths. These patients frequently have relative immunity from tooth decay, and clean, white, well-shaped teeth. The pockets which develop tend to develop quickly, unobtrusively and generally in odd areas about the mouth i. e. not generally about each tooth as in the inflammatory or simplex type of periodontal disease, but rather on perhaps one surface of 2 or 3 widely separated teeth. These pockets eventually

entrap enough debris to produce some inflammation. The condition is then called complex periodontitis. Of all periodontal conditions seen, the simplex type probably makes up 80%, the complex type makes of 20% and the so called necrotic periodontitis only a fraction of a per cent.

On page 165 of your text, the last paragraph implies that recession of the gum tissue is normal and desirable. This opinion is open to some question. Our teaching in this area is that recession is not normal nor particularly desirable. Primitive peoples like the Eskimo are not subject to recession.

Most recessions are the result of an inadequately developed or thin supporting structure which is abused by some form of local irritation, usually tooth brush trauma.

Periodontal disease is believed to be highly significant as a source of infection to the patient, more so, for example, than a periapical area of infection about a non-vital tooth. The reasons for this are -

1. The area of infection in a case of periodontal disease is much larger than might be imagined, certainly much larger than most periapical areas.
2. Periapical areas tend to be circumscribed or walled off whereas periodontal infection is not walled off and is highly vascular.
3. A large number of potentially pathogenic bacteria inhabit the periodontal pocket than the periapical areas.
4. Movement of teeth within the periodontal pocket tends to force bacteria out of the pocket into the pocket wall, where they are taken up by the lymphatic system and produce bacteraemias.

When periodontitis is not arrested the supporting structure of the teeth is progressively destroyed. The pockets of unattached gum tissue become deeper and deeper, collect more debris and bacteria and become more significant as a source of infection. The teeth become loose, to the point of inability to chew on them. The deep pockets containing the infective process occasionally become the sites of acute inflammation with resultant rapid burrowing of the infection into the deeper tissues, and the production of inflammatory exudate which cannot escape. The result is so called periodontal abscess or lateral abscess. This is different from an abscess caused by tooth decay which we spoke of as a periapical abscess.

ORAL LESIONS _ may be produced from mechanical injury e.g. cheek biting; thermal injury, e.g. hot tea or coffee or chemical injury e.g. aspirin burn. The results are approximately the same. The degree

of injury varying from slight redness to frank ulceration.

Changes in the oral mucosa may be due to micro organisms. The change produced is usually characteristic of the micro organism involved.

e. g. Herpetic Gingivo Stomatitis caused by the herpes simplex virus. This disease is common in children and involves the oral mucous membrane. The gingivae become red, shiny and swollen.

Small blisters appear on the tongue, gingiva, palate, floor of mouth etc. These rapidly break leaving small pin head size ulcers which are extremely painful. The lips may be encrusted. Temperature of patient is usually elevated, lymph nodes enlarged. This is highly contagious. It generally runs a course of 10 - 14 days then heals. Anti bodies are built up in the blood. One attack confers immunity to a second acute attack, but periodically patients will have so called canker sores or aphthous ulcers or "cold sores" on the lip. This is believed due to the fact that once the virus has entered the patient it continues to live in the tissue and produce these lesions just mentioned when the patient's resistance is lowered. Aphthous ulcers or cold sores frequently follow colds, stomach upsets, emotional disturbances or hormonal changes. Occasionally following dental appointments, due to trauma produced by manipulation of the lip or needle puncture, or cotton rolls sticking to the tissue and then being pulled off, ulcers or cold sores may develop.

Thrush is a fungus infection, found usually in very young or old persons who are debilitated from some other disease. Sometimes it follows antibiotic therapy. Whitish raised patches like clotted milk cover areas of the throat, tongue, or oral mucosa. When peeled off it leaves a bleeding surface.

Other oral lesions are covered in your text starting on page 170.

For additional reading may we suggest:

Oral Pathology by Kerr and Ash

Oral Medicine by Burkett

INTRODUCTION

The smallest plants known are much too tiny to be seen individually without a microscope. These plants are called bacteria. Inside a small letter "o" there would be room for thousands of bacteria.

Almost everywhere you go there are bacteria. They are in the air we breathe, in the ground we walk on, in the water we drink, and in the food we eat. They are even growing on our skin and inside us.

There are over a thousand different kinds of bacteria but basically there are just three shapes - round, rod-shaped and spiral.

These tiny plants multiply by each plant dividing into two and perhaps in only twenty minutes a bacteria may become fully mature and divide into two identical bacteria.

You may tend to think of bacteria as vast armies of germs constantly lying in wait, ready to attack any poor human that comes near them. While it is true that some produce disease, the great majority do not and actually may be beneficial. For example, without bacteria to make dead plants and animals decay the world would soon be piled high with debris and with no room left for living things.

HISTORY

The history of bacteriology is a fascinating one; it is a story of the gropings, fumbings, great personal sacrifices and exciting discoveries of the pioneers of bacteriology. (A highly interesting book on the subject is - *Microbe Hunters* by Paul DeKruif).

The very first man in the world to see bacteria was Anton van Leeuwenhoek. Born in 1632 in Holland, he ran a dry-goods store. He had heard that if you very carefully ground very small lenses out of clear glass, you would see things look much bigger than with the naked eye. In time he learned how to make these lenses and in fact was able to make the best lenses in Europe. His curiosity was immense and through his lenses he observed everything you can think of, from the brain of a fly to the legs of a louse.

One day he looked through his lens at a small drop of clear rain water and this was the day to bring Leeuwenhoek immortality. This was the day that man first "had stolen upon and peeped into a fantastic sub-visible world of little things, creatures that had lived, had bred, had battled, had died, completely hidden from and unknown to all men from the beginning of time".

In the water he saw dozens of "wretched beasties" as he called them. "They stop, they stand still as 'twere upon a point, and then turn themselves round with that swiftness, as we see a top turn round, the circumference they make being no bigger than that of a fine grain of sand.

Until his death in 1723 Leeuwenhoek studied bacteria through his lenses, made accurate drawings and estimates of their size, discovered and described bacteria of the mouth and discovered also that heat kills bacteria. He failed to realize that any of these bacteria might cause human disease but did show that bacteria could devour and kill living material much larger than they themselves were.

For thirty five years or more after the death of Leeuwenhoek the "wretched beasties" seemed to be forgotten and had the little animals not got themselves involved in a strange argument they might have been completely forgotten. The argument was: Can living things arise spontaneously, or does every living thing have parents? At this time the majority opinion was in favor of spontaneous origination of life and that little sub-visible animals certainly could arise by themselves. It was said that they could arise spontaneously from soup or gravy. However, an Italian, Lazzaro Spallanzani, did not believe the story and set out to prove it wrong. By boiling soup in a flask for a long time then sealing over the flask and leaving it for many days then opening it and finding not one bacterium in it did he disprove the spontaneous generation theory. He also discovered that bacteria reproduce by division.

A French chemist, Louis Pasteur became interested in fermentation and started studies on the subject which he continued from 1857-1877. He proved that yeast is a living organism which splits sugar into alcohol, carbon dioxide and other products, that different types of fermentation are caused by different micro organisms; decomposition of organic matter by putrefaction is the work of living organisms; the "diseases" of wine are due to the introduction of foreign micro organisms and spoilage can be prevented by heating the wine.

Pasteurs' brilliant and fundamental work had far-reaching effect. So impressed was an English surgeon, Joseph Lister, that he decided to apply the principles of fermentation to the problem of putrefaction of wounds. He reasoned that micro organisms might cause the suppuration and putrefaction which usually were present with surgery done in those days. At that time gangrene, tetanus and other diseases flourished among surgical cases. In 1865 Lister set out to destroy bacteria in surgical wounds by the generous use of carbolic acid on the patients skin, the surgeons, instruments and dressings, and later in a spray over the operative field. At first his methods were highly scorned by the rest of the medical profession but when it became known that almost none of Listers' patients were dying of gas gangrene the story changed.

In 1876, Robert Koch, a German physician, demonstrated the results of four years' investigation which definitely established the bacillus as the cause of anthrax and introduced exact methods that soon changed the study of microbes from guesswork to a science. He perfected a technique by which the little rods from the diseased animal were cultivated outside the body, and he produced the disease by injection of a culture in which the anthrax bacillus was unaccompanied by other microorganisms or body fluids from the diseased animal. In 1881 he introduced a practical method for obtaining pure cultures by the use of nutrient gelatin and other solid media and thus gave to bacteriology the tools which permitted the exhaustive study of individual bacteria. Koch discovered the tubercle bacillus and devised a set of rules known as Kochs' postulates for determining the cause of an infectious disease.

Kochs' Postulates: (1) The organisms must be present in all cases of the disease. (2) The organisms must be isolated in pure culture (3) The organism must be capable of producing the disease in another person or animal (4) The organism must be recovered again in pure culture from the experimental animal.

Pasteur, in the next few years, developed methods of prophylactic vaccination for anthrax, swine erysipelas and rabies.

Metchnikoff in 1884 discovered body cells, the phagocytes that devour invading microorganisms and foreign particles.

By 1900 the causes and methods of transmission of many diseases had been found. Most startling of all was the unexpected discovery of important agents of communicable disease which were unlike any known microorganisms and alien to all familiar biologic concepts - the viruses. These viruses as demonstrated by Iwanowski could pass through a filter which would screen out the bacteria from fluids in which they were grown.

The present knowledge of microbiology is vast and impressive but probably just scratches the surface of many fundamental problems. For example: Does a virus cause human cancer? What are the answers to the common cold? These and many other problems confront researchers of to-day and certainly in time many of the answers will be found.

WHAT IS MICROBIOLOGY?

It is the study of protozoa, microscopic algae, molds, yeasts, and molds, bacteria, rickettsiae and viruses.

PROTOZOA are one - celled animals.

ALGAE are chlorophyll-bearing, microscopic plants.

BACTERIA are a great class of microscopic fungi which can be subdivided into groups that range from distinctly mold-like to protozoan-like forms.

YEASTS AND MOLDS

also belong to the large group of organisms known as fungi. Molds are multicellular and some of the largest mold plants are visible to the unaided eye. Yeasts are closely related to molds but they are one-celled and less complex.

RICKETTSIAE AND VIRUSES

multiply inside the living cells of other larger organisms, and both are important agents of disease. Rickettsiae are smaller than bacteria but larger than viruses.

BACTERIA

(a) General characteristics

- (i) May possess both animal and plant-like characteristics suggesting borderline organization between the true fungi and the protozoa.
- (ii) One-celled.
- (iii) Reproduce by binary fission.
- (iv) Absence of a mouth or any mechanism for ingestion of solid food, a rigid cell wall and certain cell constituents serve to separate bacteria from the animal kingdom (i. e. protozoa)

(b) Fundamental Forms

- (i) Spherical - Coccus
- (ii) Cylindrical rod - Bacillus
- (iii) Corkscrew shape - Sprillum

Variations of these fundamental forms are Spirochetes, a narrow elongated cell twisted into a number of coils around its long axis. Another variation is Actinomycetes, a long filamentous cell showing branching. If cocci occur singly they are called monococci, when in pairs Diplococci, in chains Streptococci.

(ii) Cultivation of Microorganisms

More can be learned about bacteria by growing them than, by observing their appearance under a microscope. The term culture is used to denote a population of microorganisms in an environment which supports their growth, while the nutrient substance in which the organisms grow is the culture medium.

Many different culture media have been devised such as -Meat infusion broth, Meat infusion agar, Blood agar and even living tissues such as the chick embryo.

On these media different types of bacteria grow to produce various types of colonies. For instance, *Micrococcus aureus* produces yellow colonies and *Micrococcus albus* produces white colonies.

VIRUSES

Viruses are so small they make bacteria seem enormous by comparison. Virus particles range in size from 10 millimicrons to 300 millimicrons (One millimicron equals 1/1000 of a micron). Viruses propagate only inside living cells, consequently techniques used in the cultivation of animal viruses include animal inoculation and cultivation in embryonated eggs and in tissue cultures. Diseases caused by Viruses

- Smallpox
- Chickenpox
- Measles
- Mumps
- Common Cold
- Influenza
- Warts
- Yellow Fever
- Rabies

Some investigators believe that a virus may be related to cancer.. Several neoplasms of plants and animals are due to viruses and there are many analogies between the infectious animal and vegetable neoplasms on one hand and human neoplasms on the other. However, the actual relationship, if any, is obscure.

One theory is that cancer viruses may be latent in the tissue cells of certain people and once induced to proliferate by a carcinogenic agent (i. e. X-rays, ultraviolet, coal-tar derivatives etc., which are known to have induced neoplasms) the virus will cause some cells of the body to change in their characteristics so that they grown independently without regard for normal physiological limitations, spreading and growing everywhere, each tumor cell a malignant parasite.

(c) Size

The size of bacteria is measured in microns.

1 Micron - 1/1,000th of a millimeter.

A coccus is from .75 of a micron to 1.25 microns in diameter.

(d) Structure

- (i) Flagella - propel bacteria by spiral waves along the length of the flagella. Not all bacteria have flagella and those that do not are usually non-motile.

Bacterial Motility - Whatever their mechanism of motility, motile bacteria can move only in fluids by their own volition. However, they may travel long distances as passengers on particles of dust in the air, on objects like pencils, utensils etc. or in droplets such as those given off by a person when sneezing or coughing.

- (ii) Capsule - may appear as thickened layer of cell wall or a secreted mucoid coating (or slime layer).

- (iii) Cell Wall - A thin, sharply-defined, relatively tough, somewhat rigid structure just inside the capsule. All the nutrient material for the cell must pass through it and all digestive enzymes and other products given off by the cell during its life must pass back out through it. Therefore its chemical composition must be most complex.

- (iv) Protoplasm - The material inside the cell wall.

- (a) Cytoplasm - clear, watery or slightly viscous and homogeneous appearance.

- (b) Nuclear Structure - granular in appearance.

2. METHODS OF STUDY AND IDENTIFICATION

- (i) Microscope - Simple Liquid mount
- The Hanging Drop
- The Fixed Stain Mount
- Simple staining
- Negative or Relief Staining
- Gram Stain
- Dark field

THE RICKETTSIA

Smaller than most bacteria but larger than most viruses.

Exist only in living tissues.

Frequently live in the intestinal tracts of insects which may transmit the rickettsia to man.

Disease caused by the Rickettsia - typhus, spotted fever, Q-fever and rickettsialpox.

YEASTS AND FUNGI

Yeasts - are one-celled fungi that commonly reproduce by budding.

They are oval, round or cigar-shaped cells about 5 microns in diameter, considerably larger than bacteria. Molds - are more complicated in structure. Masses of filamentous threads called mycelia make up the mold colony.

Yeasts and molds influence human welfare in three ways: those helpful to man i. e. soil fertility and therefore the production of food for man depends largely on the biochemical activities of the microorganisms living in the soil. Yeasts are used for industrial fermentation in the production of malt beverages, beer, ale and wine. The discovery that the mold *Penicillium notatum* produces penicillin, introduced a new type of therapy for infectious diseases. Many new antibiotics of this type have since been discovered.

Those involving economic loss i. e. Many millions of dollars are lost each year from food spoilage by yeasts and molds. Even such materials as damp fabrics, leather material or book bindings can be affected.

Those that are pathogenic i. e. Ringworm of scalp, Athletes' foot, Oral thrush, Vaginitis, Sporotrichosis, Actinomycosis.

METHODS BY WHICH MICROORGANISMS MAY PRODUCE DISEASE

1. They must gain entrance to the body in sufficient numbers.
(usually the defences of the body can adequately cope with small numbers.
2. Exotoxins - powerful poisons given off from the bacterial cell. These poisons usually affect a specific area of the body such as a heart muscle, nerve tissue etc.
3. Endotoxins - are usually weak poisons bound inside the bacterial cell and which are not as specific as to the type of tissue they damage.
4. Hypersensitivity reactions - Antibodies in the body reacting with the protein of bacteria may cause severe tissue damage or even death. (i. e. the tubercle bacillus causes a hypersensitivity reaction in the body which results in damage to certain areas of the body, particularly lungs).

RESISTANCE TO INFECTION

1. Unbroken skin and mucous membranes are the first natural barriers.
2. Skin - Secretions which can kill some bacteria (bactericidal)
3. Mucous membranes - produce mucous secretions which entrap bacteria and have cilia which move in waves and push bacteria and other foreign materials to outside i. e. in nasal passages.
4. Saliva - has certain bactericidal properties.
If bacteria penetrate thru' skin or mucous membrane what happens now?
5. Polymorphonuclear leucocytes - (white blood cells) of the body are attracted to the site where the bacteria are and these cells engulf the bacteria.
6. Lymph nodes - a type of tissue which acts as a filtering station and helps to strain out the bacteria from the lymph stream in the body.
7. Chemical Defences of Body:-

- (a) Antibodies - are substances produced by the body to destroy a specific antigen. What is an antigen? It can be any foreign protein that enters the body i. e. bacteria or their products.

If your body has the ability to produce antibodies against a bacteria and thereby prevent infection by those bacteria you are said to be immune or have immunity to the type of disease caused by that particular type of bacteria.

Immunity may be divided into two categories

- (i) Natural Immunity - those antibodies you are born with i. e. babies have certain antibodies at birth which may protect them against certain diseases for several months.
- (ii) Acquired Immunity - that which occurs after birth; of which there are two types: - (a) Active Acquired Immunity - i. e. you have a specific disease such as mumps and your body produces antibodies which protect you from any future attacks of this disease.

This active acquired immunity can also be produced by injecting a vaccine or toxoid into a person causing his body to produce antibodies against that vaccine or toxoid.

What is a vaccine or toxoid?

A Vaccine - is a suspension of killed or attenuated bacteria (reduced in activity) or viruses that when injected into a person will cause him to produce antibodies against the disease without his actually having the disease.

We spoke previously of toxins that bacteria produced - poisons that caused disease. Now toxoids are altered or attenuated (weakened) toxins which cause the production of antibodies against a disease without producing the symptoms of the disease.

(b) Passively Acquired Immunity

You take serum from a horse that has developed large numbers of antibodies against a specific disease i. e. diphtheria. This gives immediate protection from that disease but this protection lasts only a few months. This type of serum is called an antiserum and is used only when a person has been directly exposed to a disease and needs immediate protection. Bacteremia or Septicemia - the circulation of bacteria through the body.

Forms of Infection - A source from which bacteria or toxins are carried throughout the body. i. e. abscessed teeth, or periodontal pockets.

TRANSMISSION OF DISEASE

1. Droplet infection - commonest method.
Disease transmitted by this method - common cold, flue, measles, chickenpox, tuberculosis.
2. Direct contact - i. e. dentist or nurse touching skin infection in or near a patients' mouth could carry the infection to another patient.
3. Indirect contact - i. e. from improperly sterilized instruments in dental office the bacteria may be transmitted from previous patient.

Some diseases which can be carried this way are common cold, flue, scarlet fever, infectious hepatitis.

METHODS OF CONTROL

- (a) Physical
 - (i) Washing of hands and instruments reduces the numbers of bacteria simply by a physical washing away of large numbers.

- (ii) Dry Heat - used to sterilize towels, surgical gauze, glassware, syringes and needles. 338° - 356° F. for 2 1/2 - 3 hours.
- (iii) Boiling Water - Syringes, needles and instruments 20 mins. of actively boiling water.
- (iv) Steam under pressure - i. e. for any material that is not damaged by moisture. 20 - 30 minutes at 15-20 lb. pressure.
- (b) Chemical
 - (i) Cold sterilization solutions i. e. Zepheran Chloride, Lysol, Formalin, Alcohol.
 - (ii) Bacterial destruction in the patient - i. e. Sulfa and Antibiotics such as Penicillin, Aureomycin, Achromycin, Streptomycin, Terramycin.

Prolonged treatment with antibiotics is usually not recommended because suppression of bacteria may allow a marked growth of fungi. The patient may present with a very black appearing tongue, aptly described as "hairy black tongue". It simply means there is an overgrowth of certain fungi in the mouth because other bacteria of the mouth are not multiplying and the fungi are then allowed to run wild.

BACTERIOLOGY OF: -

(1) Dental Decay (or Caries)

Certain bacteria such as the Lactobacillus Acidophilus grow well on carbohydrates and when the latter are present and growth is rapid, high concentrations of acid are produced in a short time. This acid appears to dissolve the cementing substances that hold the enamel rods together.

As you probably know, carbohydrates are such things as starches and sugars i. e. pie, cake, candy - all the things that taste so good. But these provide the materials for the decay process.

(2) Bacteriology of Periodontal Disease

The mouth teems with bacteria but normally there appears to be a symbiotic balance in which little or no damage to mouth tissues occurs. The quantitative and qualitative aspects of the flora are extremely variable and different mouths often present considerably different pictures as to the percentage of similar organisms present.

Bacteria certainly play a part in periodontal disease. Whether their role is primary or secondary is yet to be proved but bacteria and their products certainly aggravate and perpetuate periodontal disease. Bacteria may damage tissue in many ways, such as by releasing products which cause edema, breaking down protein, inhibiting the clotting mechanism or facilitating "spreading" through the tissues by proliferating bacteria and toxins.

Whether or not any of these mechanisms take place depends on a variable and difficult to determine factor called - host resistance. This resistance comprises antibodies and phagocytic activity, age, sex, heredity, nutritional status and even the mental state of the patient.

- (3) Periapical and Periodontal Abscess - if the carious process is allowed to continue eventually bacteria reach the pulp where growth conditions are ideal and bacteria multiply rapidly. Toxins are given off from the bacteria and an acute inflammation of the pulp takes place giving pain. When the bacteria reach the apex of the tooth large numbers of leucocytes are attracted to the area. Dead leucocytes, tissue cells, bacteria and fluid accumulate to form pus.

(4) Periodontitis

Periodontal pockets provide ideal surroundings for bacterial growth because here the bacteria are protected from the washing action of saliva and from the tooth brush. The deeper the pocket the better the chances for bacterial growth. An acute inflammation may result with resultant pain, redness, swelling and discharge of blood and pus.

(5) Necrotic Gingivitis

Vincent's infection	)	
Ulceronecrotic Gingivostomatitis	)	Other names for this same
Fusospirochetosis	)	disease.
Trench mouth	)	
Acute Ulceromembranous gingivitis	)	

Incidence

Found more frequently in the adolescent and although poor oral hygiene is a common and important predisposing cause the disease may occur in individuals with good oral hygiene.

Inadequate nutrition, worry, insufficient rest and heavy smoking may predispose to this disease.

Etiology

Fusiform bacillus and B orrelia Vincenti, plus other types of spirochetes, vibrios and streptococci.

An underlying tissue change is required to facilitate the pathogenic activity of the bacteria.

PREDISPOSING FACTORS: -

(a) Local -

- (i) Chronic inflammation results in circulatory and degenerative alterations which increase the susceptibility to infection. i. e. calculus or metallic deposits in the tissues.
- (ii) Pericoronal flaps or malposed teeth or deep pockets.
- (iii) Poor dentistry i. e. overhanging margins, bridges which cause food accumulation under pontics, poor contact points.
- (iv) Areas of gingiva subjected to trauma from opposing teeth in malocclusion i. e. lingual of upper incisors.

(b) Systemic -

- (i) Malnutrition, particularly deficiencies of vitamin B complex and C.
- (ii) Diseases of blood forming tissues - leukemia, malignant neutropenia, aplastic anemia.
- (iii) Other debilitating diseases - gastro-intestinal disturbances, influenza, common cold.
- (iv) Endocrine disturbances.

Epidemiology

The contagious nature of the disease has been overemphasized. It cannot be considered as a communicable or contagious disease.

It is a common impression that because necrotic gingivitis often occurs in groups using the same kitchen facilities, that the disease must have been spread by bacteria on eating utensils. There is no evidence to substantiate this assumption.

Forms of Necrotic Gingivitis

- | | | | | | |
|-----|-------|-----|---------|-----|-----------|
| (1) | Acute | (2) | Chronic | (3) | Recurrent |
|-----|-------|-----|---------|-----|-----------|

Acute Form -

Sudden onset, severe burning pain and profuse salivation, metallic taste, spontaneous bleeding, characteristic odor. Punched-out ulceration developing more commonly on the interdental papilla and marginal gingiva. May be a yellowish gray, pseudomembrane. Bleeding and pain when the slightest pressure is applied to the tissues. Regional lymph nodes enlarged. Ulcerations may develop on cheeks, lips, tongue, palate and pharyngeal area. General malaise and a temperature to 103° may be present.

Treatment

- (1) Control of bacterial phase.
- (2) Elimination of local and systemic predisposing factors.
- (3) Education in proper oral hygiene habits and recall appointments.

Prognosis

Excellent so far as pain is concerned; however, the damaged interdental papillae may not regenerate completely. These areas may develop into more serious periodontal problems unless the patients' home care is excellent.

(6) HERPETIC GINGIVOSTOMATITIS

A generalized oral herpetic eruption which is believed to result from the initial infection with the herpes simplex virus. A history of exposure to an individual with herpetic lesions is frequently obtained 10 to 14 days previously.

The usual intra-oral herpetic lesions appear as small, extremely painful eroded areas, which have a bright red raised border during the first few days of their presence. After 4 or 5 days the herpetic lesions become covered with a yellow opaque cheesy material which is raised above the surrounding mucosa.

Sporadic herpetic lesions may occur with a cold, menstruation or gastro-intestinal upset. The lesions are called herpes simplex or "cold sores".

(7)

MONILIASIS (THRUSH)

Caused by a yeastlike fungus - *Candida albicans*. The disease may accompany vitamin deficiencies or after antibiotic therapy where other bacteria are eliminated. When broad-spectrum antibiotics are used for periods exceeding 5 to 7 days the patient should receive B complex.

The characteristic lesions are creamy-white, simulating coagulated milk, adherent and, when forcibly removed, give rise to bleeding points.

XX ENDODONTICS

An Outline of Some Basic Principles Involved in Root Canal Therapy

Endodontics is that branch of dentistry which covers all surgery and therapeutics relating to the protection of the vital pulp, mechanical and chemical care of the pathologically involved pulp and the material obliteration of the space formerly containing the pulp.

Fundamental Principles

If successful endodontic treatment is to be performed certain fundamental principles must be observed.

1. The tooth must be operable
2. The root canal must be rendered sterile
3. The sterile root canal must be obliterated, and the dentinal tubules sealed by agents of known tissue tolerance
4. Economic and health factors must justify the operation.

Before proceeding to discuss the techniques involved in root canal therapy, two very important aspects of this subject should be touched on. They are bacteriology and sterilization. As sterilization is the basis of a successful endodontic practice it is of utmost importance to me. Each of you should also be vitally interested in this subject in order to protect the patients, your dentist and yourself.

Bacteriology

I do not believe it is necessary to go too deeply into this subject of bacteriology but I do feel that it is wise for you to have some idea of the organisms which you mean to destroy. I hope that it will help you to better perform those phases of your duties which relate to sterilization. It is wise to remember the old maxim - "Know thy Enemy".

Bacteria are microscopic, unicellular organisms and Bacteriology is the study of bacteria and their relation to health and disease. Disease is caused principally by the growth and activity of bacteria in the body. Before causing disease, however, the bacteria must first gain an entrance into the body and find a suitable place in which to multiply. This invasion of body is known as infection.

You must also understand that bacteria are so tiny that not only are they invisible to the naked eye, but only the most powerful microscopes can magnify them sufficiently for observation.

Bacteria require moisture, moderately high temperature (warmth), darkness or comparative darkness and most important of all; an adequate supply of the proper food. Incidentally, it must be immediately obvious that the mouth, fulfilling most of these requirements, becomes an ideal breeding place for bacteria.

There are many bacteria which are beneficial to man but we will concern ourselves with the disease-producing or pathogenic bacteria. These pathogenic bacteria may be further divided into those which form spores. The former give little trouble as they are easily destroyed but the latter defy all but the most positive methods of sterilization.

Four Most Common Types

1. Bacilli cylindrical shape - in this class fall the organisms which cause Tuberculosis and Tetanus. Also classified as to stain - either Gram positive or negative.
2. Cocci spherioidal shape - commonly found as meningococcus, pneumococcus, staphylococcus or streptococcus. This is a group we are very interested in endodontia. Three types of streptococcus are commonly found in infected root canals.
3. Spirallae spiral - like in appearance
4. Spores very difficult to destroy. It is because of these spores that careful sterilization must be carried out or disease may be transmitted from one person to another.

METHODS OF STERILIZATION

Two definitions which must be very clear in your mind before we start this subject are:

1. Sterilization - the destruction of all organisms.
2. Disinfection - the destruction of all organisms which may cause infection.

One basic principal which should be followed carefully - all instruments must be scrubbed thoroughly with soap and water. Special instruments require special treatment.

For example: burs - wire brush
 root canal instruments - sponge

Particular attention should be paid to all joints and crevices.

The following methods are recognized by bacteriologists as satisfactory methods of sterilization and disinfection.

1. Direct Flame - used in two ways

- A. With a direct flame it is limited to platinum based instruments such as iridio-platinum needles. The instrument is heated to cherry red, twice.
- B. With a direct flame plus immersion in alcohol - the tips of shears, cotton pliers, burs may be sterilized by dipping in alcohol and burning them off in a flame before use. Isopropyl alcohol (70%) is used.

2. Sterilization by Immersion in Molten Metal - (Molten Metal Sterilizer - Esquire).

is of primary value in sterilization of root canal instruments - files and reamers

consists of a metal cup in which an alloy melting about 380°F - 400°F is rendered molten by means of a thermostatically controlled electrical supply

- Dip in and leave - 5 seconds for broaches and files.
- 10 seconds for paper points and cotton pellets.

The latest advance in this field is the use of either glass beads or rock salt in the sterilizer in place of molten metal.

Advantages - 1. Takes place of flaming

Disadvantages 1. Strict attention must be given accurate timing.
2. Metal tends to stick to instrument and may be carried into the root canal.

3. Sterilization in Hot Air (Dry Heat Oven)

thermostatically controlled hot air sterilizers are now manufactured. It runs for one hour at 320°F . This method is preferred for root canal instruments.

Advantages

1. Files do not rust
2. Paper points and pellets are dry
3. Ideal for instruments with a fine cutting edge and suture and hypodermic needles
4. This is method of choice in root canal work if you are using Kerr case (metal container which holds a variety of root canal instruments).

Disadvantages

1. Oven not included in office equipment
2. If temperature regulator is inaccurate and temperature goes up to 350° - 360° and then solder will melt on files and on elevators. Paper points and pellets will burn.

4. Chemical or Cold Sterilization

most commonly used drugs are Radiol, Zephiran Chloride or Metaphen Germicidal Solution

This method of sterilization is primarily of value in storing instruments which have been previously sterilized, (Reamers, Files in Stender Dishes). This is only a method of disinfection and is used in an air tight dish such as a Bard Parker Sterilizer. All the long handled instruments (mirrors, Tweezers, explorers, etc.) used in Root Canal Therapy are stored here, prior to placing them on a sterile towel. It is used when no other method is practicable for primary sterilization as in preparation of gutta percha cones in endodontics. Place cones in solution 20 to 30 minutes before use.

- Disadvantages
1. Never to be used for injection needles.
 2. Many bacteria are only inactivated, not killed.

5. Sterilization in Boiling Water - Hot Water Sterilizer

This method has been in use for many years. The water should be boiling for 15 - 20 minutes before the instruments are placed in the sterilizer or else rust will form. Some form of anti-rust material is usually used in these types of sterilizer;

1. Sodium Carbonate
2. Nitrodene

The water must cover all the instruments for them to be sterilized thoroughly.

Instruments are removed with sterile forceps from the sterilizer.

Remember if any unsterile object comes in contact with a sterile instrument the chain of sterility is broken and all the remaining instruments are contaminated and must be resterilized. Another thing, after you have removed instruments from office sterilizer, dry them immediately or they will rust.

- Advantages -
1. This method may be used for the majority of instruments (long handled, forceps, hypodermic needles).
 2. Most satisfactory for largest number of instruments.

- Disadvantages
1. May rust if you are not careful.
 2. Will dull most of the sharp, delicate cutting instruments temper injured by repeated heating.
 3. It will destroy all vegetative organisms but fails in sterilizing of spore-forming bacteria (anaerobies). These anaerobies spores are found in the mouth very rare.

6. Sterilization by Steam Under Pressure - Autoclaving

Steam under pressure reaches a higher temperature than does free flowing steam. Recommended procedure is 250°F and 15 lbs. for 10 - 15 minutes. The temperature is the more important factor in the autoclave, not the pressure. If instruments are wrapped in muslin then they will remain sterile. All forms of bacteria succumb to heat under pressure (used in hospitals). As success in this form of sterilization depends upon the free circulation of steam, it is imperative that all packs and instruments be placed loosely in the autoclave.

Advantages

1. By means of this steam under pressure towels, gauze packs, rubber gloves and all operative and surgery instruments.
2. The high-speed autoclave which has been recently introduced is rapidly replacing the boiling water sterilizer in the dental office.

Disadvantages

1. Root Canal instruments may rust - only way is to lay them flat on towel.
2. Steam cannot penetrate closed metal containers (Kerr Kits).
3. With steam, some materials take a long time to dry out.

7. Sterilization in Hot Oil

- Silicone oil is used in this type of sterilization.
- use a temperature of 250°F for 15 minutes. This is tremendously effective for geared or jointed instruments (contra angles and forceps). Handpieces placed in such a medium for 10 to 15 minutes will be sterile and lubricated. Excess oil may be removed by wiping the surface with a towel moistened in alcohol. From the economy standpoint the handpiece will last many times longer than when such treatment is not given. Not a necessary piece of equipment with the new high speed which has to be lubricated and cleansed after each patient.

Endodontics requires for many of its phases a sterile technique and consequently makes use of many of the above methods of sterilization.

PRECAUTIONS FOR AN ASEPTIC TECHNIQUE

1. All instruments used in root canal therapy should be sterilized, not disinfected.
2. Instruments which enter the root canal must not be exposed to the air.

3. Tooth under treatment must be isolated so as not to be infected. This is accomplished by the use of the rubber dam, removal of all carious dentin and sometimes even a copper or steel band may be necessary.
4. The culture tube must be opened and inoculated in such a way as to prevent air contamination.
5. The tooth after and during treatment must be sealed so saliva cannot penetrate the seal.

ROOT CANAL THERAPY PROCEDURES

We will deal with this under four headings.

1. Conditions, pathological and others requiring root canal therapy.
2. Root Canal Cultures - What and Why?
3. Conservative Root Canal Therapy.
4. Surgical Root Canal Therapy.

CONDITIONS REQUIRING ROOT CANAL THERAPY

1. Acute Serous Pulpitis - an acutely painful inflammation of the dental pulp characterized by lancinating paroxysms of pain.
2. Acute Suppurative Pulpitis an acutely painful inflammation of the pulp characterized by abscess formation upon the surface of, or within, the pulp.
3. Chronic Ulcerative Pulpitis pulpal disease characterized by the formation of an ulcer upon the surface of the pulp.
4. Chronic Hypertrophic Pulpitis a productive inflammation of an exposed pulp from a long standing low-grade irritation.
5. Internal Resorption a rapid resorption of the dentin through vascular changes within the pulp.
6. Fractured Teeth usually traumatic - involving an exposure of the vital pulp.
7. Mechanical exposure of pulp during operative procedures.

8. Intentional pulp extirpation

in cases where additional retention is required for restorative work.

9. Necrotic Pulpitis

gangrene of the pulp.

ROOT CANAL CULTURED

In the past, often the only test for sterility before sealing a root canal was the three "S" test (smell, seepage, symptoms). We feel that in these days of modern dentistry with its high speed cutting instruments, more potent local anaesthetics, etc. that this is not nearly good enough. The only method to ascertain that the root canal treatment procedures are effective in achieving and maintaining sterile conditions, is to check by bacterial culture. A sampling from the root canal is placed in the culture media which is subsequently placed in an incubator for forty-eight hours minimum at body temperature of 98.6°F or 37°C.

Culture medias are generally of two types depending upon whether an antibiotic is being used in the therapy or not. A very often used media is Glucose Ascites Media which is available with or without penecillinase (a penecillin inhibitor).

If there are organisms within the root canal, they will grow in this media and it will become cloudy (a positive culture). No growth with the media indicates an absence of organisms and hence a negative culture. In general, two negative cultures are required before filling any conservatively treated endodontic case.

Many organisms are found from these cultures within the root canal. 82% of all root canal cultures will show some type of streptococcus bacteria, either viridans, hemolyticus or anhemolytiass. Other organisms found from root canals are actinomycetes bovis, bacilus subtilis, staphylococci, lactobacillus, acidophilus and yeasts.

There are two basic group of drugs which are used within root canals to combat these organisms.

A. Non Specific Drugs

1. CPMCP - Camphorated para mono
chloro phenol
2. Cresatin

B. Antibiotic Preparations

1. P.B.S.C. - a polyantibiotic paste which contains penecillin, bacitraun, streptomycin, sodium caprylate in a silicone base.
2. A.T.F. - another combination of antibiotics.

CONSERVATIVE ROOT CANAL THERAPY

Conservative treatment involves many of the principles which we have mentioned previously. The canal must be thoroughly cleansed and rendered sterile by use of various medicaments. When we have two successive negative cultures, we are now ready to fill the root canal by one of the following methods:

1. Lateral Condensation of Gutta Percha - primarily used in anterior teeth.
2. Silver point technique (Jasper) - molars and bicuspids.
3. Combination of the above two methods (a combination filling).
4. Chloro percha filling (Callahan technique).

The most widely used technique and the one which is taught basically in the Faculty Clinic at the University, is the lateral condensation of gutta percha. Therefore we will follow a case of this type through the various steps involved to complete an endodontic case

BIOMECHANICAL PRINCIPLES IN CONSERVATIVE ROOT CANAL THERAPY

Before commencing root canal treatment, the following principles must be observed:

- (1) Familiarity with the variations in root anatomy of all teeth.
- (2) The different pulp and periapical pathological conditions
- (3) To synchronize endodontic surgery with the diagnosis obtained by clinical and radiographic means.

The importance of the mechanical preparation of the root canal rather than reliance upon antiseptics cannot be stressed too strongly. The object of the mechanical preparation is to remove all pulpal tissue, foreign debris and all softened or infected dentine. Properly done, this will allow root canal antiseptics to work effectively.

Operative Rules

- (1) Establish an accurate coronal opening so that direct access can be obtained along straight lines.
- (2) Narrow instruments should precede wide ones in sequence of sizes. Never jump sizes.
- (3) Reamers, if used at all, should precede files and should be given only 1/4 turn before withdrawing.

- (4) Never force a root canal instrument when it binds.
- (5) Apical tissues should not be traumatized.

Stages of Instrumentation in an Upper Anterior

- (1) Gain entrance through the enamel with a small, round diamond just incisively to the lingual fossa and at right angles to the tooth surface.
- (2) After dentin is penetrated, use a round bur to enlarge the cavity.
- (3) When the pulp is reached, change direction to that of the pulp chamber and use a flame bur to give the walls of the cavity a gradual taper leading to the root canal.
- (4) Remove all remnants of tissue from the pulpal horns to prevent discoloration of the crown.
- (5) Remove a vital pulp with one or more barbed brooches which have been inserted along the side of the canal and turned a few times.
- (6) Establish the correct tooth length by estimating the approximate tooth length from the pre-operative X-ray and using this length on a marked file in the canal with a new X-ray.
- (7) Proceed to enlarge the canal with files observing the correct tooth length. A file should be removed applying traction and lateral pressure against the walls of the canal.
- (8) File in a bath of chlorinated soda using also hydrogen peroxide to "boil" out the loose debris and filings.

Things to Observe in Biomechanical Cleansing

- (1) Try to arrange ample time. Never hurry.
- (2) Never force an instrument against a curvature construction or other obstruction.
- (3) Always begin with fine instruments, never thick, rigid ones.
- (4) Do not use machine driven instruments.
- (5) Do not bend instruments more than 30 degrees.
- (6) Do not pass instruments through the apical foremen unless it is imposed by a special technique.
- (7) Do not use old and worn instruments. Use new or almost new files, etc., on every case to avoid breakage in the canals.

SEQUENTIAL STEPS IN LATERAL CONDENSATION OF GUTTA-PERCHA POINTS

- (1) Select a gutta-percha point which when placed in the canal and cut flush with the incisal edge, is the same length as that of the last marked file used.
- (2) Take a trial point X-ray to verify correct length.
- (3) Remove the point and dry the walls of the canal by using paper points moistened with alcohol.

- (4) Roll the trial gutta-percha point in a suitable sealer cement such as Kerr's and place it in the canal flush with the incisal edge. Do not use a pumping motion as sealer will be driven into the peri-apical tissues
- (5) Place a Kerr spreader number 3 alongside the point in place and by lining the next point parallel with the spreader, it is possible to pass the next point into the pathway made by the spreader upon its withdrawal. Be sure to use gutta-percha points with a diameter less than that of the spreader.
- (6) Repeat until no further points can be introduced, i. e., when it is impossible to insert the spreader.
- (7) Remove excess gutta-percha points with a hot instrument, and take care to remove all traces of sealer and rubber from the clinical crown to prevent discoloration.

SURGICAL ROOT CANAL THERAPY

Immediate root resection may be done only upon teeth that are clinically comfortable. This technique may be summarized as follows:

- (1) Suitable local anaesthesia is given; usually 1.4 cc. of a xylocaine-epinephrin solution is injected labially, and 0.4 cc. lingually or into the anterior palatine foramen, if the operation is to be performed on an upper anterior tooth.
- (2) The rubber dam is then applied and sterilized prior to opening into the tooth.
- (3) The debris from the root canal is removed with a fine barbed broach.
- (4) The canal is enlarged with reamers and files in the presence chlorinated soda solution in the canal. This instrumentation should be a careful procedure, all instruments being fitted with a stop to prevent them from being carried through the apical foramen.
- (5) The canal is irrigated alternatively with hydrogen peroxide and with chlorinated soda, the final irrigating solution always being the chlorinated soda.
- (6) The canal surface is now sterilized by one of three following methods:
 1. Electrolytic medication
 2. A concentrated thymol solution
 3. Dehydrated phenol sulfuric acid
- (7) The root canal is dried, then filled with a gutta percha or silver cone and a root canal cement. Overfilling is preferable since it makes a hermetic seal and helps the operator in locating the root end during the resection operation.
- (8) The rubber dam is removed and a booster dose of anaesthesia is given if necessary.
- (9) The field of operation is walled off with gauze and is sterilized with untinted tincture of metaphen.
- (10) A semilunar incision is made right down to the bone from the centre of each adjacent, or longer tooth.

- (11) The flap is lifted away from the bone and retracted (both mucosa and periosteum).
- (12) Following the surface topography over the root, and arched opening is made with burr to expose the root end. The labial plate of bone over the root tip is lifted away.
- (13) At this time, if necessary, 1-3 mm. of root tip is removed. Be conservative. Only enough should be removed to enable operator to curette lingual root surface.
- (14) The osseous bed is thoroughly curetted, removing all soft granulation tissue.
- (15) The wound is irrigated with sterile saline or procaine solution to remove bone chips, debris, etc. Curette again to promote flow of blood, if necessary.
- (16) The flap is replaced and sutured with .000 black silk suture.
- (17) Post operative instructions are given.

POST OPERATIVE CARE FOLLOWING SURGERY

1. Apply ice pack over area twenty minutes of each hour for first day - continue ice packs second if needed.
2. Do not lift lip to examine the incision for 3 to 4 days.
3. Eat soft foods.
4. Brush teeth carefully up and down avoiding gums in the area of operation.
5. Use salt water mouth wash only after meals.
6. Take pain tablets as directed.
7. Return in one week to have sutures removed.

INTRODUCTION

In your duties as a dental assistant, there are really three separate activities; namely, those of assistant, secretary and nurse. In oral surgery, as in no other branch of Dentistry, you will be acting primarily in the capacity of a nurse. To illustrate the way that a patient should be handled, we are going to take you along on a typical appointment from the original telephone call to the final dismissal of the oral surgery patient.

Oral surgery is, as the name implies, surgery of the mouth and includes the surrounding structures, such as the jaws, the cheek, the tongue and the lips. The most common operation, and the one most likely encountered in a general practitioner's office, is exodontia, or the extraction of teeth.

The Appointment is Made

When a patient phones for an appointment to have a tooth extracted, he is very often in a somewhat confused mental state. While this may seem a very routine procedure to us, it is far from routine to the person calling your office. He is usually scared and may be even rather incoherent. A sympathetic approach with a few leading questions will help considerably to ease the tension. Frequently the patient has had very little or no sleep due to pain and his nerves are frayed to the breaking point. I have heard some assistant say on the phone in a petulant voice, "Speak up. I cannot hear you, "or, "Why did you not call earlier if you are in such pain?" This approach will only serve to make things worse for the already rattled individual on the other end of the line. You should try to find out which tooth is aching; is there any swelling; if a wisdom tooth, is it all the way through or imbedded (impacted). The reason for the latter information is that while wisdom teeth, particularly lower ones, are erupting there is often an infection under the tissue flap on the tooth causing much soreness and a difficulty in opening the mouth. This is known as an ankylosis. In this instance, you would make a short appointment for examination and your doctor would probably wish to put the patient on penicillin or other antibiotic, take an x-ray and then plan to remove the tooth later. It would be a waste of valuable time to save an hour for such a case.

It is most important that anyone who is suffering pain should be seen at the earliest possible moment. It is of no help to a patient with a toothache to say that you can squeeze him in between appointments a week from next Friday. If it is impossible to see him the same day, see that he is referred to someone who can help, or perhaps your doctor would prefer to phone his drug and have an analgesic (pain killing) drug, such as a codeine preparation, sent to the patient to keep him comfortable until the following day. We all know that many decayed teeth are due to neglect and your first thought might be to

take the attitude that the pain would not be there if the person had phoned months earlier. However, you must remember we are members of a health profession and have dedicated ourselves to help people in distress, not to stand in judgment on them. Think of the Golden Rule and see how you would feel if your positions were reversed.

During the telephone conversation, you will be able to decide whether a patient is a calm phlegmatic individual, or a highly nervous excitable one. It would be wise with the latter person to make a note in the appointment book and to bring him in a bit early for his appointment so that a sedative drug could be administered to make him more co-operative, and less apprehensive.

The Patient Arrives

Let us assume that the patient has now arrived in the waiting room for the appointment and it is his first visit. You are the first person he will see and your attitude, both now and previously on the telephone, can help to make his first impressions pleasant ones. Once again, when filling out the usual information on his chart, you can decide whether or not this is going to be a difficult individual to work with, and suggest to your doctor that he looks like a good subject for pre-operative sedation. The usual drug is a barbiturate such as Nembutal or Seconal. These sedatives, also called hypnotics, act by depressing the central nervous system and relieving tension. They do not reduce pain as do the analgesic drugs which we shall discuss later. The sedatives may be given orally or intravenously. In most offices, a capsule will be given by mouth and the usual time for its effect is half an hour. The average dosage is 1 1/2 grains for male adults and 3/4 grain for female adults and children. This, of course, will be decided by your doctor. One word of caution is to be noted, that after being given a sedative, a patient should not drive a car for several hours as his ability is impaired in the same way as though he had been drinking alcohol. In some offices, you will find that tranquilizer drugs are used in place of barbiturates for the same purpose of relieving anxiety and tension. To illustrate the fear that some individuals display, an often-heard remark before an extraction is, "Oh, Doctor, I'd rather have a baby than have this tooth out," and it is said in all seriousness.

During the reception of a new patient, you may be given information that will be of great value to your doctor later. Anything concerning the health of the person should be noted on his chart. Certain confidences will be given to you, such as the fact that a patient has just started her menstrual period. Make a note of this on the chart, or tell your doctor about it. At this time of the month, for example, the tendency toward post-operative haemorrhage is greater, and the number of extractions may be reduced greatly. Also nervousness and irritability are increased and a sedative may be indicated for greater co-operation. Other things to be noted on the chart are the past history of heart disease, rheumatic fever, diabetes, allergies, tendency toward fainting, previous dry sockets or prolonged bleeding. If a patient volunteers the information that he is under a physician's care, make a note of the doctor's

name, and if possible a brief mention of the reason for the treatment. Your doctor can question the patient further on any matter of interest using your notes as a guide. If a patient has any swelling, it is helpful to take his temperature and note this on his chart. This will assist the doctor in deciding whether antibiotics are indicated.

The Patient in the Operating Room

We are now ready to bring the patient to the operating room. After seating him in the chair, it is wise to place a fairly large plastic apron to protect clothing against staining. A towel is then placed around the neck in the usual manner. Instruments, particularly forceps and syringes, should be out of sight and the ones on the tray covered with a towel until ready for use. As time goes on you will know what instruments are used for any particular extraction. You can anticipate the requirements and get them ready for your doctor.

Let us suppose that an extraction of a lower tooth is indicated and your doctor has made the local anaesthetic injection. In the next few minutes while waiting for it to take effect, do not walk away and leave the patient alone. He is scared and his heart is starting to pound a bit from the adrenalin in the anaesthetic solution and he needs some attention. Try to talk to him cheerfully to take his mind away from the impending extraction. Talk about his job, the weather, anything to keep him occupied. If you must leave him, ask if he would like to read a magazine but always look in on him during these few minutes to check for signs of fainting or distress. Many people, particularly athletic males, have a tendency to faint after a local anaesthetic. This is a mental reaction in the majority of cases and can be well illustrated by the number of men in the Forces who pass out while in a line to receive shots in the arm. This occurs before the needle has penetrated the arm and can hardly be called an allergy. As an experiment, a few years ago, an anaesthetic company gathered some people who claimed to be allergic to a local anaesthetic and unknown to them injected a salt solution. They fainted just as regularly because of their needle phobia.

The signs of fainting are very typical. The patient becomes pale, then a dirty gray colour and beads of cold perspiration break out on the forehead and face. The hands are cold and clammy. He may complain of feeling sick and in some cases will actually vomit. Without any treatment he will lose consciousness and may exhibit convulsive movements. The reason for these signs is that due to mental shock and fear, the blood pressure has dropped and a large quantity of blood is literally drained from the upper extremities including the brain and collected in the spleen and lower extremities. The patient loses consciousness because of lack of oxygen in the brain.

The treatment is to place a very cold towel on the forehead and to force the patient's head down between his legs. This will by gravity assist the movement of blood to the brain and will compress the spleen to assist the process. A capsule of spirits of ammonia is broken and placed under the patient's nose to stimulate respiration. After a few minutes the operation may proceed but the cold towel is kept in place. A small amount of brandy is often helpful in restoring the patient to a more normal feeling. If oxygen is available, its administration will assist in rapid recovery.

During the extraction you can be of great help to your doctor. When the forceps are applied to a lower tooth, the resulting force causes the mandible to move in its attachment to the temporomandibular joint. If you stand behind the patient and steady the jaw with cupped hands, the extraction will be more comfortable for all concerned. Most offices are now equipped with a suction machine or aspirator as it is known, and this is used to take away blood and saliva and to keep the field clean for the doctor. The lip may be retracted with your left hand, using the mouth mirror, and the aspirator tip in the right hand is moved quickly backward and forward over the operation area. A fast motion of the tip means that it works more efficiently and like a moving propeller on an aeroplane, it is easy to see through.

When the extraction is completed, the patient should bite on a piece of gauze to control bleeding. He is then taken to a retiring room if such is available, or left sitting in the chair for about 10 minutes. No one is sent out of the office immediately following surgery as it is necessary to be sure that bleeding is controlled.

The Patient is Dismissed

Upon dismissal, patients are given post-operative instruction. This is a very important part of the routine of caring for the surgery patient. Many post-operative haemorrhages can be controlled by the patient if he knows what to do. We have found that it is a time-saver to print these instructions and to hand them to the patient so that he may read them at home. One of the items on the sheet refers to bruising or discolouration. Until this was added, many people phoned and complained of the colour of the face and now they accept this as a possible sequel to normal surgery. Around the face there is a very copious blood supply and any surgery may result in internal bleeding and subsequent bruising. This varies in each individual of course. You have all seen the result of a blow near the eye or mouth in which discolouration occurs rapidly and swelling is very easily produced.

Any surgery which has involved the use of sutures will of course mean a return trip for the patient for their removal. This is done normally in about five days and the patient is told that it is a very easy procedure requiring only a few minutes. Many people recall the removal of abdominal

sutures which is rather painful, but since the sutures in the mouth are wet, they come out easily and painlessly.

All patients are given some analgesic or pain-killing tablets for use after the local anaesthetic has gone to control pain. Small envelopes can be ready with instructions on the outside, "One every three hours for pain." Usually the analgesic is an aspirin compound but some tablets containing codeine are given to patients who have had severe surgery such as a cyst or an impacted tooth or multiple difficult extractions. Following the insertion of an immediate complete denture in which the denture is placed right after extractions, the patient is cautioned not to remove the denture for 24 hours and then to return to the office for the first inspection. After this period he may take out the denture for cleaning purposes and return it immediately.

Now for a few notes on miscellaneous subjects connected with oral surgery.

The Care of Instruments

All instruments and forceps used in oral surgery must be kept covered and stored preferably in covered cloth containers that have been autoclaved. Sterility is of prime importance in all branches of dental practice but in surgery particular care must be taken in the storage and handling of instruments. Forceps are available to transport elevators, etc., to the tray from the drawer or table upon which they are stored. After use, all blood and debris must be scrubbed thoroughly with soap and a stiff brush before the instruments go into the sterilizer.

Hypodermic syringes and cutting instruments such as scalpels require particular attention. It is wise to adopt a weekly routine of discarding needles and blades as through repeated sterilization they become dull and brittle. Needles should not be sharpened but discarded when they develop a bur or become dull. Carpules used for anaesthesia are only used once and if any solution is left, the carpule is thrown away. There is often a back flow of blood or serum from the tissue into the carpule and serious infection could result from a second use on a different patient. After sterilization, syringes should be stored between sterile towels or kept in a suitable closed glass jar to prevent contamination. Recently the use of disposable needles has become popular and these are highly recommended.

Forceps that have become stiff to open or close may be relieved by the use of a few drops of spirits of ammonia in the joint followed by a vigorous opening and closing of the beaks, and rinsing.

Dry Sockets

Patients will frequently telephone a couple of days following an extraction and complain of pain in the area radiating to the ear on that side. They

should be brought in immediately as they probably have developed a dry or empty socket which is extremely painful.

Normally the original blood clot fills the socket and eventually turns into solid tissue and bone. If there is an insufficient blood supply in the socket area, the clot breaks down and food and saliva get into the surface of the bone causing great pain. Dressings are placed to relieve the condition which generally lasts 4 - 10 days. The dressing is changed every 24 - 48 hours until the pain is gone.

Abscessed Teeth

Many remarks will be made to you concerning abscessed or ulcerated teeth. There are two main types of abscesses - one which forms at the end of the root and the other which occurs as a periodontal abscess from a pyorrhoea pocket around the tooth.

In the first instance, the tooth is generally carious or has been heavily filled. Heat and cold shocks cause a hyperaemia or engorgement of the blood vessels in the pulp. The vessels attempt to swell and strangle themselves resulting in a dead pulp. A live tooth does not develop an apical abscess. Bacteria live in the dead material and form an abscess which results in extreme tenderness of the tooth and eventually a swelling once the abscess has spread away from the tooth to the soft tissue. Drainage or extraction is indicated to reduce the abscess. The periodontal abscess is slightly different in that the infection has started in a pocket around the tooth and there may not even be a cavity present. The tooth will, however, be generally loose and tender.

General Anaesthesia

It is quite possible that some of you may be in an office where some general anaesthesia is being used. I shall not attempt to deal with the various techniques employed, but will merely touch upon some of the highlights of assistance.

Aspiration under general anaesthesia is extremely important. Remember that we have an unconscious patient, and blood and debris must be removed quickly from the mouth to prevent aspiration into the lungs.

All instruments must be readily available as it is essential to work as quickly and efficiently as possible under general anaesthesia. During the recovery period patients must be watched and checked constantly. When the appointment is arranged, the patient is cautioned not to have anything to eat or drink for at least four hours prior to the appointment time and to be accompanied by a responsible person. Needless to say, no one is allowed to drive a car following a general anaesthetic. Many of the general patients are small

children who are very difficult or impossible to handle with local anaesthesia. You cannot reason with a young child. He may be very reluctant to permit a mask to be placed over his nose, but keep repeating to him that there will be no pain. He may have to be held gently but firmly during the induction. After it is all over, he will realize it was not so bad after all and will not hold a grudge against the dentist or his staff.

CONCLUSION

In conclusion, I should like to relate a true experience that occurred in our office. A patient came in and said she used to go to Dr. X for extractions. She went on to say that he was a very good oral surgeon and his work was excellent, but, "I could not stand the attitude of his nurse. She made an appointment reluctantly as though she was doing me a great favour and was always grouchy when I was in the office." This girl was literally driving patients away from the office by her attitude. On the other hand, a pleasant efficient assistant can make the appointment a pleasure and will increase the practice.

There has been much discussion lately on the subject of the use of auxilliary personnel in the dental office. Apart from the regular duties of an assistant, with training you can perform the following operations directly on a patient, - Taking X-rays for the doctor after he has seen the patient, - Removal of sutures, - changing of dressings for conditions such as dry socket after the doctor has established the diagnosis. You will find this personal contact with the patient very rewarding and your value to the doctor will increase greatly.

GOODMAN AND GILLMAN

Pharmacology embraces the knowledge of the source, physical, and chemical properties, compounding, physiological actions, absorption, fate and excretion and therapeutic uses of drugs.

A drug may be defined as any chemical agent which affects living protoplasm. Few substances would escape inclusion in this definition.

KRANTZ AND KARR

Pharmacology is the science that deals with drugs. In its broadest sense, it includes all of the knowledge that has been accumulated regarding medicinal agents.

Pharmacy is concerned with the collection, preparation, and standardization of drugs. Its scope includes the cultivation of plants which serve as drugs, synthesis of chemical compounds of medicinal value, and the chemical analysis and testing of the agents used for medicinal purposes.

The Pharmacist is responsible for the manufacture of dosage forms of drugs such as tablets, capsules, and sterile solutions for injection.

TOXICOLOGY

Is the science of poisons. It is concerned with the mechanism of action of poisonous substances on living organisms.

Some of the drugs which were subsequently of value as medicinal agents, were used by the ancients as plant extracts and known to possess certain therapeutic properties. A difficulty arose, however, when using an extract of poppy seed which would include the active alkaloids of opium - it was found that not all samples gave equal effects. The reason for this, of course, was that not all seeds of the poppy contained the same percentage of these alkaloids, one sample being richer, the other poorer. The result was that when a patient required this medication, the effects were extremely unpredictable and one sample could not be compared accurately with another.

More recently the drug Curare, which was used by South American Indians as a poison for their arrows, was found to be of value in anaesthesia. This drug was effective by virtue of its relaxing effect on muscle fibres, affecting the transmitting of impulses between nerve and muscle. As a result, when an animal or an enemy was pierced by the arrow, he became an easy victim. The drug was obtained as an extract of the barks of certain trees and was imported in bamboo tubes and small earthenware pots. It was not until practical tests for strength and purity had been devised that any progress was made in using the drug clinically.

We here in Canada use the British Pharmacopea which is our standard as far as the qualities of a drug are concerned. This book merely lists the drug, if it is an approved therapeutic agent, describes and defines it with respect to source, chemistry, physical properties, tests for identity, test for purity, assay, method of storage and average therapeutic dose. This insures that when you order A. S. A. tablets or Acetyl salicylic Acid B. P. from the druggist, it will be the same drug regardless of who makes it and regardless of what trade name is placed on it. To ensure this, the Food and Drug Division of the Dominion Government have men on the road all the time, picking drugs up at random and sending them to the lab. for analysis. This protection is essential for the well-being of the public and ensures that a drug will meet certain standards and contain the effective agents as set out on the label. There are many duties performed by this governmental division, but suffice it to say that they are your protection against unscrupulous manufacturers.

When the Dentist or Physician or Veterinarian decides that a certain drug is indicated in a specific case, it is necessary to instruct the Pharmacist to deliver it to the patient. Many offices have their own dispensaries and many more used to have, and of course in these cases, the use of a prescription is not essential. However, a standard method is needed which the Pharmacist will understand and which will prevent any mistake being made. At one time prescriptions were written in Latin and many of these Latin forms or their abbreviations are still used extensively. Otherwise English is used. There are two sets of weights and measures in use - the Apothacaries, which is measured in grains and fluid ounces, and the Metric, which is measured in milligrams and cc's. The use of English and the Metric system is most frequently used today for the reason that the English is more easily understood - if it is legibly written, and the Metric system allows the figuring of dosage forms without converting it to a number of unwieldy digits.

A typical prescription is an order to the Pharmacist to first take a certain quantity of a certain drug so it starts with the familiar Rx which is just one of those hangovers from the Latin meaning "take Thou". The drugs are then listed and their quantities set out. Instructions are then given as to how they are to be dispensed - whether in capsule or as elixer or as an ointment - beginning with the letter M or Misce - (mix). The word Sig. or "label" is then written followed by instructions as to how it should be labeled: "Poison - for external use only" or "one tablet every four hours for pain" etc. Latin abbreviations may be substituted. This prescription will bear the patient's name and address and the date on the top and will be signed at the bottom by the writer.

The Pharmacist is required by law to retain on file all prescriptions for certain drugs termed narcotics. The records are then checked periodically by a government agent to be sure that no one individual is receiving a drug in undue quantity because these drugs can bring a high price on the illicit drug market. Also, drugs are listed as prescription drugs to prevent self-medication.

by the patient which could be extremely dangerous. The reason for some ambiguity and the use of Latin on prescriptions was to prevent Mrs. Jones from diagnosing Mrs. Smith's ailment as the same as her own and recommending the same remedy which Dr. Taylor prescribed for her. The danger inherent in such a situation is quite obvious.

The Pharmacist is well acquainted with the use of drugs and their dosage forms. In the event of any doubt about the dosage, he would "phone" the Physician or Dentist and check to be sure that no error existed before dispensing the drug. This provides a check for the safety of the patient.

FACTORS MODIFYING DRUG ACTION

- (1) Dose - Obviously the dose of a drug greatly influences its actions. The amount of a drug which causes untoward symptoms in the average individual is known as the toxic dose; the amount which kills, the fatal dose.

The minimal dose of a substance is the smallest amount which has therapeutic effects; the maximal dose is the largest amount which can be tolerated without toxic symptoms. Somewhere between the minimal and maximal doses of a drug lies the optimal or therapeutic dose.

- (2) Age - As a rule children are more sensitive to drugs than are adults and there are certain agents to which very young individuals are abnormally susceptible - central nervous system depressants.
- (3) Body Weight - The ratio between body weight and the amount of drug given determines the concentration which can be attained in the body. Therefore the dose should be adjusted when prescribing for an abnormally light or heavy individual.
- (4) Sex - Women are more susceptible than men to some substances. During pregnancy caution should be used in administering drugs affecting the uterus.
- (5) Time of Administration - Particularly true of oral therapy in relation to meals. Absorption proceeds more rapidly if the stomach and upper part of the intestine are free of food. In the case of irritating foods, more can be given after a meal.
- (6) Rate of Excretion - If chronic medication is necessary, the rate of excretion and destruction of a drug is a necessary consideration in determining dosage. If a drug is repeatedly given and absorbed at a rate more rapid than it can be destroyed or excreted, the concentration in the body will rise and toxic symptoms will occur. This is known as cumulative action. It is often desirable to maintain an even concentration in the body in order to obtain a constant level of therapeutic effect. Once this level has been attained, the so-called maintenance dose can be determined, that is, the daily dose of a drug which balances the rate of elimination or destruction.

- (7) Drug combinations - When the combined action of two drugs administered at the same time is equal to the algebraic sum of their individual effects, the response is summation. Summation can be negative or positive. Negative summation is termed antagonism. The stimulants and depressants of the C.N.S. are outstanding examples of antagonistic groups of drugs.

Positive summation is known as synergism. Most drugs producing the same type of response are synergistic when prescribed together. It is sometimes advantageous to prescribe two synergistic drugs rather than a single agent.

- toxic effects of the individual components are exerted on different physiological systems.

- also some drugs have a rapid onset but short duration, others have a slow onset and longer duration.

There are instances in which the combined action of two drugs is greater than that which can be anticipated by the sum of their individual effects. This is known as potentiation.

Tolerance - person tolerant to a drug he has never taken before - individual tolerance.

Resistance to drugs sometimes results in tolerance to chemically related compounds having similar action - called cross tolerance.

The continued use of some drugs may lead to habituation - characterized by a psychic craving manifested when the drug is withdrawn. Carried further, addiction occurs where withdrawal results not only in psychic craving, but a characteristic abstinence syndrome producing a distorted physiological process.

MECHANISM OF DRUG ACTION

The typical response of a cell to a drug is definitely limited by the functions of that cell. Drugs cannot impart new functions to cells or tissues, but rather can only stimulate or depress cellular activity. The degree to which drugs stimulate or depress can be controlled by dosage and in this way the intensity of action of a drug can be adjusted so as to be of therapeutic value.

As pertinent examples may be cited the depressants of the C.N.S. which are of clinical value because their degree of activity can be regulated. Any desired intensity of depression can be obtained and this may be varied from sedation, through somnolence, to anaesthesia sufficiently deep to allow performance of major surgical procedures. Conversely, the level of function can be raised by drugs which stimulate the cerebrospinal axis.

Disease is often characterized by a change in the functional capacity of certain tissues. For example, congestive heart failure is characterized by an underlying impairment of the contractile power of the myocardium. Inasmuch as a cardiac stimulant can do no more than enable the fibers to contract up to the maximal physiologic limit of which they are capable, the therapeutic value of digitalis in cardiac decompensation is dependent upon and limited by the inherent functional reserve of the myocardium.

Selective Action of Drugs - Most drugs are selective in action, that is, they affect only a specific tissue.

Sites of Drug Action - Some drugs act directly on effector cells, others exert their actions in a remote and roundabout manner. In many cases the site of action is unknown. Those substances which act directly upon the responding cell have two possible sites of action - the surface, or the interior of the cell. The very rapid response of effector organs to certain drugs suggests that the site of drug action is extracellular. On the other hand, there is evidence that the tissues respond to many chemicals only after they have penetrated the cellular membrane.

Again, the site of action of a drug may be removed from the tissue which ultimately responds to give the desired effect. For example, a substance may lower blood pressure by action on the vasomotor center. A respiratory stimulant may act on the carotid body rather than on the medulla. Also, drugs may exert their effects in an indirect manner by promoting or preventing the action of another substance. Physostigmine stimulates structures innervated by cholinergic nerves, not directly, but by inhibiting the enzyme which normally destroys acetylcholine. Atropine inhibits the same structures by preventing the access of acetylcholine to the effector cells.

Absorption of Drugs - It is of practical importance to know the manner in which individual drugs are absorbed. In many instances the question of absorption influences the route by which a drug is administered. The speed of absorption is a factor in determining dosage.

The most important factors influencing absorption

Route of Administration - Of all factors which influence the absorption of drugs, the route of administration is the most important. Often there is a choice of the route of administration and a knowledge of the advantages and disadvantages of the different methods is of primary importance.

- (1) Oral - the oldest route, the safest, most convenient, and economical. Drugs given by mouth are for the most part absorbed by the intestinal mucosa, and usually absorption is complete by the time the colon is reached. Seldom does an appreciable portion reach the circulation through the stomach. However, there are several disadvantages to the oral ingestion of drugs. Irritating substances cannot be given by mouth for they may cause emesis.

It is obviously not feasible to give treatment by this route to a patient who is vomiting or moribund. Many drugs are destroyed by the action of digestive ferments before they can be absorbed. Lastly, intestinal absorption may at times be somewhat irregular due to the influence of other substances in the gastro-intestinal tract, variations in the emptying time of the stomach, the PH of intestinal contents, etc.

- (2) Injection - Many drugs are given by injection. This has certain advantages over oral administration which at times are of distinct value. In some instances this route of administration is essential in order that the drug may be absorbed in a more active form. Absorption is usually more rapid and more predictable than when a drug is given by mouth. The effective dose can be more accurately selected. Emergency - if a patient is unconscious, unco-operative or unable to retain anything by mouth, it may be a necessity.

There are several disadvantages:

- difficult for a patient to inject himself where self-medication is a necessary procedure;
- strict asepsis necessary to avoid infection;
- intravascular injection - when not intended;
- more expensive and less safe;
- pain accompanying injection.

Subcutaneous - only drugs which are not irritating - otherwise slough will occur

Intramuscular - deep in muscle tissue - rapidly absorbed - irritating substances given which cannot be given subcutaneously.

Intraperitoneal - peritonitis

Intravenous - level reached with accuracy and immediately, not possible otherwise - important in emergencies. Irritating and hypertonic solutions can be given only in this way - blood vessel walls are relatively insensitive.

Intrathecal - into subarachnoid space.

- (3) Inhalation - Gaseous and volatile drugs may be inhaled and absorbed through the pulmonary endothelium or mucous membranes of the respiratory tract anaesthetics.
- (4) Mucous Membranes - Many drugs are applied for their local effect but the odd one where systemic effect is desired.
- (5) Skin - few drugs can penetrate intact skin iontophoresis.
- (6) Inunction - fatty vehicle rubbed into the skin.

Hypnosis - in the pharmacological sense, is a condition of sleep produced by the hypnotic drugs.

Sedation - is a milder state of central depression in which the patient, although awake, has a lessened degree of cortical excitability and is therefore more calm and tranquil.

Analgesic - this term refers to drugs which obtund the perception of pain. It differs from a Narcotic in that it characteristically relieves pain without producing stupefaction or unconsciousness.

Hypnotics

Chloral Hydrate - a colourless, transparent, crystalline substance with an aromatic, penetrating, slightly acrid odour, and bitter, caustic taste.

Paraldehyde - because of its odour, paraldehyde cannot be often employed for mild sedation in ambulatory patients.

Usual dose: 3 to 8 cc.

Bromides - danger of cumulative poisoning.

Dose varies, but moderate sedation is usually obtained by the administration of from 3 to 5 gms. daily, provided the patient is eating well.

The Barbiturates

Long Acting

- Barbitol
- Diallylbarbituric acid
- Mephobarbital
- Phenobarbital

Intermediate Acting

- Allylbarbituric acid
- Amobarbital

Short Acting

- Cyclobarbitol
- Pentobarbital
- Secobarbital

Ultra Short Acting

- Hexobarbital sodium
- Hemithal sodium
- Thiamylal sodium
- Thiopental sodium

Contraindications:

1. Persons with a known idiosyncrasy to them.
2. Those depending on renal excretion, not used in patients with renal impairment.
3. Those barbiturates destroyed by the liver, not used in impaired liver function.

Meperidine - (Demerol)

The major pharmacological property of Meperidine is to produce analgesia and the drug is employed primarily for the relief of pain.

Dosage - 50 - 100 mgm. orally or intramuscularly.

Alphaprodine - (Nisentil)

A close congener of Meperidine.

Adult dose for analgesia - 40 - 60 mgm. administered subcutaneously.

Alkaloids of Opium

The average adult dose of Morphine salt is 8 to 20 mgm. but dose varies with factors such as the patient's illness, factors of idiosyncrasy, and level of reflex excitability of the nervous system. The hypodermic dose is slightly smaller than the oral.

Codeine

Available as the free alkaloidal base and in the form of its water soluble salts, codeine sulphate and codeine phosphate. The average dose for adults is 16 - 60 mgm. given orally or hypodermically.

Metopon

A synthetic derivative of morphine, but approximately twice as analgesic. Euphoria not a prominent feature, but unpredictable respiratory depression develops when used in conjunction with inhalation anaesthetics. As effective orally as by injection. Marketed in 3 mgm. capsules.

Dihydromorphinone (dilaudid)

A derivative of morphine which is more analgesic. Average dose is 1/4 that of morphine, 1 - 4 mgm. but the length of action is shorter. May be used orally, hypodermically, intravenously, or rectally.

Pantopon or Omnipon

A mixture of purified opium alkaloids by weight about 50% morphine. Available for oral use or parental use. Usual therapeutic dose, about 20 mgm.

Ataraxic Drugs - (freedom from confusion and anxiety or tranquilizer)

Chlorpromazine (Largactil or Thorazine)

Exerts a quieting effect on excited, overactive, psychiatric patients. Marketed for use in 10 and 25 mgm. tablets, in ampules containing 25 mgm. per ml. of sterile solution. The dose for adults is 25 - 50 mgm. three or four times per day. The oral route is as effective as the parenteral route.

Reserpine - (Serpasil - Ciba)

Used as a tranquilizing agent. Nasal stuffiness in approximately 50% of patients is relieved with neosynephrine. Average daily oral dose is 1.0 mgm. (four 0.25 mgm. tablets). Individual dose is adjusted according to the patient's response.

Meprobamate - (Equanil - Wyeth)

An effective agent for restoring equanimity when anxiety and tension are encountered among office patients.

Dosage - usually one 400 mgm. tablet three times per day.

Because of low toxicity, wide variations may be set.

Mephenesin (Anatensin - B. D. H.)
(Anxine - Allen and Hanbury)
(Solserol - Squibb)

A relaxant and sedative for anxiety states. Exerts a selective action on the C.N.S. and other effects are not pronounced.

Should not be used with a barbiturate. Anxine is not recommended for children.

Dose - one tablet taken one hour before appointment.

ANTIBIOTICS- a substance produced by micro-organisms as opposed to chemo-therapeutic agents which are synthesized in a chemical laboratory.

Sulphonamides: - are not as frequently used to-day, not because of ineffectiveness but due to more effectual agents being discovered with fewer side effects.

Penicillin: - the drug of choice in dentistry since its activity is against those organisms most frequently implicated in dental infections. Some patients don't tolerate this and other drugs, and a history of past experiences is valuable in preventing an untoward reaction.

Erythromycin: - this drug affects approximately the same bacterial spectrum as penicillin and is used frequently as a substitute in those patients who do not tolerate penicillin. Some organisms are sensitive to this drug which are insensitive to others.

Achromycin: (Tetracycline) Terramycin: Chlortetracycline: Aureomycin: Oxytetracycline: - these broad spectrum antibiotics are used in dentistry where an organism is encountered which is susceptible to them.

Neomycin: Tyrothycin: Bacitracin: Polymyxin: - are used in lozenges and troches due to their local effect on bacteria. These drugs do not appear to have this same tendency to produce sensitivity reactions.

ASTRINGENTS - a mildly astringent effect of a mouth wash is one which precipitates protein and gives the mouth a fresh, clean taste and feeling.

STYPTICS - are drugs which stop bleeding by precipitating the protein content of blood forming a false clot.

HAEMOSTATICS - may be in any form which will stop blood flow and might include such widely different preparations as adrenaline and oxydized cellulose.

ANTISEPTICS - this is a general heading which includes those drugs which destroy bacteria. This would include soap and water, solutions of salts of heavy metals, the cationic detergents, etc.

LOCAL ANAESTHETICS - these drugs are all stimulants as opposed to depressants of the central nervous system. Ideally they are low in toxicity and cause no damage to the nerve itself. These conditions are met by most of the anaesthetics marketed to-day for dental use.

GYP SUM PRODUCTS - three classes:

- (a) dental plaster
- (b) class I dental stone
- (c) class II dental stone

- all similar, all being calcium sulphate hemihydrate, all fine powders.
- differ in the physical form of the powder crystals which give each powder its particular property and govern its use.

- (a) Plaster - small, irregular, somewhat porous crystals

Uses - 1. making study casts - orthodontics
- paedodontics

2. boxing up various types of impressions
3. mounting casts or dies on articulators
4. also used in making impressions for spacers in paedodontics

- different grades are used as to job to be done - fine and quick-setting for impressions, more granular for study models.

- (b) Class 1 stone - particles of stone are more regular, well-formed and dense when compared with crystals of plaster and when mixed with water set to a solid mass with a strength 3 or more times greater than plaster. Stone is used in same places as plaster except it is of preference where strength is required - for denture casts, orthodontic technique casts and all models for occlusal corrections and never for impressions as plaster sometimes is.

- (c) Class 11 stone - recent modification with larger particles than class 1 stone and as a result produces dies and casts with a strength about 30% harder than class 1 stone - Duroc, Velmix - used mainly for pouring up dies or partial dentures impressions.

Factors of Importance in the Use of Stone and Plaster

- ### 1. Water/Powder Ratio

Plaster - because its crystals are small irregular and porous possesses a large surface area per given weight of powder and requires a large amount of excess water to wet powder sufficiently for proper mixing - resulting gypsum has high porosity and low strength after evaporation of water.

Stone - being more uniform, denser and larger crystals requires less water for a workable mix and has therefore less porosity and greater strength.

Correct W/P Ratio

Plaster	$\frac{\text{water}}{\text{powder}}$	-	$\frac{60 \text{ ml}}{100 \text{ gm}}$	approx.
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During setting, heat is
always liberated

Class <u>I</u> Stone	$\frac{\text{water}}{\text{powder}}$	-	$\frac{30 \text{ ml}}{100 \text{ gm}}$	approx.
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Class <u>II</u> Stone	$\frac{\text{water}}{\text{powder}}$	-	$\frac{22 \text{ ml}}{100 \text{ gm}}$	approx.
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2. Setting Time - very important in the office for all materials and can be altered by the operator to suit the occasion within certain limits.

There are 2 setting times -

- (a) initial set - when mix of stone or plaster loses its gloss
- (b) final set - when pressure of edge of nail makes little or no indentation on material.

Deterioration of gypsum products can occur and alters setting time markedly - usually due to storing in a moist place.

Factors influencing setting time

- (1) Manufacturing Process - of little value, although if powder has been for some time in a moist atmosphere setting time will be increased due to humidity forming a partially impervious coating about the powder particles taking the water longer to moisten the powder during actual mixing.
- (2) Spatulation Time - if too long and rapid will create more nuclei of crystallization by breaking up the crystals of gypsum as they form and decreasing the setting time.
- (3) Water / Powder Ratio - more powder - sets quicker
- more water - sets slower
- (4) Temperature - the warmer the water - the faster the setting time

- (5) Accelerators - hasten the set with the use of partially set plaster mixed in with fresh plaster (a dirty spatula) or table salt. Most reliable is a 2 to 8% solution of potassium sulphate.
 - (6) Retarders - usually Borax or a colloidal material such as dried blood on an impression - will give a chalky spot and a poor set to a cast in that area.
3. Setting Expansion - if we use an incorrect W/P ratio, or reduced or increased spatulation beyond or below the normal we can alter the expansion during setting so that the resulting cast is unreliable.

Proper Use of Plaster and Stone

- (1) store in a dry, tightly covered container at room temp.
- (2) do not order too great quantities which could become contaminated with moisture.
- (3) use room temp. water for mixing.
- (4) use a balance for proper proportioning and a graduated cylinder for measuring.
- (5) keep bowls and spatulas and measuring equipment clean
- (6) never put a moist spatula into the container to dip out the powder.
- (7) add powder to water slowly by sifting it in gradually so as not to trap air in the powder and produce a very bubbly mix.
- (8) use a rubbing action on the sides of the bowl, rotating it so as not to incorporate air in the mix, then vibrate to remove bubbles.
- (9) do not allow cast to soak in water after sitting for any length of time as it will dissolve away the surface and destroy its accuracy.

IMPRESSION MATERIALS - types are indicated by physical properties:

- (1) Rigid - e.g. plaster
- (2) Plastic - waxes, compound
- (3) Elastic - Hydrocolloids and rubber-base materials

(1) Rigid Type - (a) Plaster - poor hard to get over undercuts and had to be broken out and put together again - still used in paedodontics for spacers - also for registrations in bridge work and prosthetic procedures - must set within 2-4 minutes, taste all right, have fine detail and no dimensional change. Mix has to be smooth, creamy, homogeneous.

(b) Zinc oxide - eugenol pastes - Opatow - 2 tubes mix on a paper slab - must not come in contact with moisture before being seated in the mouth as it is moisture that accelerates the set very rapidly. High humidity in the room, e.g. steam from the sterilizer will produce the same effect - mainly used in prosthetics for edentulous cases only.

(2) Plastic type - modeling compounds, wax-like - best used in edentulous mouths. Method - Compound

- (1) heat in a water bath of from 130° - 135° F. with paper towel in bottom of pan to prevent sticking
- (2) knead until uniformly homogeneous and plastic
- (3) adapt in a solid metal tray
- (4) flame the surface over a burner and temper in a water bath solution of about 120° - 130° F.
- (5) chill after seating in the mouth - with water. Also used for inlays or crown impressions in a copper band technique.

Ideal Impression Compounds

- (1) harden at or slightly above mouth temperature
 - (2) readily workable at a low enough temp. so that mouth tissues are not injured nor be uncomfortable
 - (3) free of poisonous or irritating ingredients
 - (4) harden uniformly, without distortion or warpage
 - (5) of a consistency to reproduce detail exactly and retain detail after hardening and during pouring of casts and not to be adhesive.
 - (6) should not deform or fracture while being withdrawn from the mouth yet reproduce all undercuts, etc.
 - (7) no dimensional changes
 - (8) glossy surface that is smooth
 - (9) no flaking during trimming at room temp.
- (3) Elastic type - used where undercuts are present - e. g. for partial dentures, always used where teeth are present, and may be used where they are absent as well.

(1) Hydrocolloids - two types

- (a) Reversible hydrocolloids - e. g. gelatin Surgident - prepared by heating and can be used over again - sets upon cooling
- (b) Irreversible hydrocolloids - usually set by chemical action and are prepared by mixing pastes, or else water and powder and cannot be used again. e. g. alginate such as Jeltrate.
- (a) Reversible Hydrocolloids - bought in a gel or solid form and are prepared to make them workable in three steps: -
 - (i) Boil for 8 - 10 minutes
 - (ii) Place in storage water at 155° F and is then kneaded until homogeneously plastic with no lumps - may be left in the bath until ready to use.
 - (iii) Temper in water at 115° F for 3 min. to avoid burning mouth tissues and to get proper working time.

Application - (a) applied around teeth in the mouth with a special syringe
(b) bulk is placed in a special water-cooled tray, which, after in position has the water then turned on.

- (iv) Fix in Zinc Sulphate solution if fixer not incorporated in material (read directions)

These impression materials tend to absorb and give off moisture and as a result will swell and shrink so should be poured up immediately and if unable to, store in a humidor after being cleared of all blood, drops of water.

- (b) Irreversible Hydrocolloids - e.g. Alginates (Jeltrate) where teeth are present - comes as a powder, mainly containing agar - a byproduct of marine plant life -
Application - Read carefully manufacturers instructions as these differ from product to product.

- (a) mix with water (both specified amounts) to form a homogeneous bubble-free paste
(b) place paste in perforated tray
(c) hold firmly in place until set (by chemical action)

Some require a fixing solution before pouring models to prevent a chalky cast surface. The impression must sit in this solution 10-15 minutes, while others do not, so read directions. All impressions using alginate have to be poured immediately as dimensional changes with this material are rapid and drastic.

- (2) Rubber impression materials - e.g. Permlastic - Very good for almost any dental procedure - dispensed in 2 tubes - base
accelerator
(More accelerator hastens set)

Temperature affects the setting of these materials and warmer the temp. - shorter the working time but also delays the setting time.

Follow manufacturers instructions and remember, different types of impression materials require different styles of trays.

- Mixing -
(1) on a paper mixing slab with cement spatula
(2) a strip of Base 2-4" in length is placed on a pad
(3) and an equal length of Accelerator is placed on the pad and the spatula blade moistened with this material
(4) mix two materials together within one minute to get a homogeneous mix - this is important - use heavy pressure and scrape the mixing pad occasionally to incorporate material on pad and gather up the material.

Dimensional change with them is not nearly as critical as for the Hydrocolloids.

DENTAL WAXES - types: - (a) inlay waxes
(b) baseplate, sheet waxes
(c) processing waxes - sticky, utility and boxing waxes.

(a) Inlay pattern waxes - used in gold or any alloy casting - comes in sticks

Properties - (1) soften without becoming flakey
(2) should be plastic enough at just above mouth temp. to force into all details of the cavity.
(3) harden at mouth temp. to allow withdrawal without distortion
(4) carve without chipping
(5) Colour should contrast with mouth tissues
(6) should not adhere to cavity wall
(7) should vaporize during normal casting procedure without leaving any residue other than carbon.

All these properties vary with the waxes of different manufacturers although they have all the above properties in varying amounts from wax to wax.

Manipulation (1) soften over a flame to a temp. comfortable to the hand and yet so that the wax is fully workable and uniformly soft throughout the piece being utilized. - do not soften in water as it changes the physical properties.
(2) after pressing into the pattern or tooth it has to be cooled slowly while being held under pressure with air or water of decreasing temp. to minimize shrinkage and warpage.
(3) do as little recarving and repairing as possible and never reheat and add molten wax to the pattern
(4) withdraw from die or tooth with extreme caution and invest immediately.

(b) Baseplate wax - used very widely in prosthetic dentistry to produce occlusion rims for wax bites in bridge-work and orthodontics - comes in sheets of varying hardness and colour.

(c) Processing waxes -
(1) sticky wax - adhere to plaster acrylic, stone and metal as well as other waxes upon heating -

used for holding together broken pieces of denture before repairing, holding teeth in position on a denture, for mounting casting patterns on sprues.

- (ii) utility wax - tacky at room temp. - for filling small voids in impressions.

DENTAL INLAY CASTING INVESTMENTS

Used in the preparation of moulds that permit the casting of inlays, crowns, or dental appliances. It is placed about the wax pattern and then the wax is eliminated through a sprue hole by heating. Also is used for soldering techniques.

Investment Properties

- (a) Composition - plaster of paris or class 1 stone (40%) and a form of silica (60%).

Plaster of paris is not used as often today as class 1 stone.
Boric acid - used to control setting expansion.

- (b) Crushing strength - strong enough to withstand the force of the gold as it is driven into the mould. Poor manipulation reduces the crushing strength below desirable limits, especially if too much water is used. Heating of mould to 1300° F. has little effect on the crushing strength although allowing it to cool down again does reduce its strength greatly. Therefore, never allow it to cool down before casting.
- (c) Setting time - controlled by the gypsum content so can be altered the same as stone or plaster.
- (d) Setting expansion - altered by gypsum content and the silica and is desirable to offset for the shrinkage of the gold as it is hardening in the mould.
- (e) Thermal expansion - heat mould to indicated temp. as directed by manufacturer of investment.
- (f) W/P ratio - more water - less thermal expansion, setting expansion and crushing strength so a casting that won't fit.

- Manipulation -
- (1) Keep in a dry, air-tight container
 - (2) measure and weigh both water and investment
 - (3) place water in bowl and then add powder, jarring bowl to remove trapped air
 - (4) hand spatulate to moisten all powder particles

- (5) then use a mechanical spatulator to avoid trapping air bubbles
- (6) vibrate to remove any trapped air

METALS AND ALLOYS USED IN DENTISTRY

- (1) Gold foil - pure gold and is extremely soft - comes in thin sheets or ropes and is of two forms:
 - (a) cohesive - will weld together at room temp, but
 - (b) noncohesive - will not.

Difference is that noncohesive foil has surface impurities usually gaseous that are absorbed on the surface of the gold and to make it workable it must be made cohesive which is done by annealing whereby the gases are driven off by heating. It is done by placing pieces of the foil on a piece of mica over an open flame or by an electric annealer.

Do not melt the gold by this method.

Allow 5 - 10 minutes annealing time. The foil is then cooled, carried to the cavity and condensed under pressure.

(2) Gold alloys and their uses

- | | | |
|-------|----------------------|----------------------------|
| (i) | casting gold alloy | Gold is the principal |
| (ii) | wrought-gold alloy | metal with copper, silver, |
| (iii) | soldering-gold alloy | platinum, palladium, and |
| | | zinc as additives. |

pure gold - 24 carat (24 parts pure gold is pure gold)
e. g. gold foil

- (i) Casting gold - 14-22 carat
-the lower the carat number, the harder is the gold alloy
- (ii) Wrought-gold alloy - used for denture clasps orthodontic appliances, spacers - is worked into shape by bending and not casting and generally contain more types of metals than does casting gold.
- (iii) Soldering - gold alloy - much the same as casting - gold alloys, however containing tin and no platinum or palladium - dispensed as cubes wire or squares. Various types of solder are available depending on the melting temp. wanted - from soft to hard solders.

- (3) Amalgam - is an alloy, one of the constituents of which is mercury and the other being filings or shavings of silver alloy to be mixed together and give amalgam. It is the most widely used filling material and the one most widely abused.

Amalgam alloy is made up of the following:

Silver	-65%	- major part giving strength, less flow, and rapid hardening
Tin	-25%	- affinity for mercury so gives easy manipulation, reduces tarnish
Copper	-6%	- increases strength and hardness, reduces flow
Zinc	-2%	- not absolutely necessary

Alloys vary in size and shape - small particle size gives a more rapid hardening, with greater strength and a smoother surface - less tarnish - easier to carve - adapts better to walls of cavity.

Mention here should be made of pellets, and automatic Amalgamator, with advantages over mortar and pestle; Also nonzinc vs. zinc alloy and micro cuts. vs. regular cuts.

TYPES OF DENTAL CEMENTS

1. Temporary Cements
2. Cavity Liners and Crown and Bridge Cements
3. Pulp Cappings
4. Silicate Cements

DENTAL CEMENTS

- (a) Zinc Oxide-Eugenol Cements - made up mainly of zinc oxide and eugenol and olive oil used as a cement in a particularly sensitive tooth.

Uses:

- (i) to act as a temporary filling to relieve pulpal irritation and inflammation
- (ii) as a liner in deep cavities
- (iii) as a pulp capping
- (iv) to cement temp. crowns in bridge work. It is a relatively weak cement with high solubility.

- (b) Zinc Phosphate Cement - for cementing inlays and crowns and as liners under metallic fillings and for temporary cements.

They are mainly zinc oxide but the liquid is ortho-phosphoric acid

and water - sets to hard mass and is soluble but not as much as zinc oxide eugenol cements. Its high acidity will irritate the pulp if used in a very deep cavity so we require some other cement first. It is a good insulator for temperature changes. It must always be mixed on a glass slab as the glass keeps the mix cool and will not allow the mix to get too warm and set rapidly.

Most dental cements can be controlled in their setting by:-

- (1) decrease the surface of the powder in contact with liquid-add small amounts of powder to liquid.
- (2) reduce temp. of mixing slab
- (3) reduce the rate of adding powder to liquid-mix slowly
- (4) reduce the amount of powder used in ratio to the liquid
- (5) prolong (within limits) the mixing time

Some are dispensed in two tubes, one a base and the other an Accelerator.

(c) Silicate Cements - for anterior fillings

powder - mainly silica, alumina, flux

liquid - mainly orthophosphoric acid, phosphates and water

It is much stronger than other cements but still relatively weak as a permanent filling material and is quite brittle and slightly soluble - with a life expectancy of 5 years usually.

Loss of water increases the setting time and increase in water content of the liquid decreases setting time - if either occurs a silicate mix made with this liquid will be less strong, more soluble, more subject to straining and will shrink more.

Cloudy liquid or liquid which has a sediment should be thrown away and new used.

Always discard after 3/4 of the bottle has been used up.

(d) Pulp Cappings

- | | | |
|-------|---------------|---|
| | | eugenol - liquid |
| (i) | Jodo formagen | calcium hydroxide-powder |
| (ii) | Pulpdent | Calcium hydroxide paste |
| (iii) | Dycal | Calcium hydroxide paste & hardners for added strength |

In all discussions of any dental material there are several basic considerations: -

1. The accuracy of measuring the ingredients - some need minute accuracy, while others do not require it.
2. Time of mixing and setting - how quickly does it set?
3. Effects of temperature.
4. Proper method of mixing or heating or manipulation.
5. Necessity of using both clean hands and clean equipment.
6. Proper equipment for both preparing and using any type of material.

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IMPRESSION MATERIALS

Lecture 1 GOLDS

Before any study of dental golds can be made a thorough understanding of the material must be made so that one can appreciate why it is selected as a restorative medium. You might ask and no doubt be asked by a patient "Why is such a material used as a filling when the colour is so unsightly?"

Gabel in his textbook "Operative Dentistry", states nine basic requisites of the ideal filling material. I might add that no one restoration meets all these requirements.

1. Insolubility in oral fluids.
2. Resistance to distortion under occlusal force.
3. Adaptability to cavity walls.
4. Co-efficient of thermal expansion close to that of tooth structure.
5. Low thermal conductivity.
6. Harmonious colour.
7. Capability of polish.
8. Convenience of manipulation.
9. A minimum of volume change due to reaction of the constituents.

(An explanation of how dental golds meet the above requirements is given in the verbal lecture series)

Gold meets most of these requirements with the exception of 5, 6, and possibly 8 unless techniques of handling are adapted to make the procedures as efficient as possible.

Dental golds are used in two forms in Operative Dentistry. Fused alloys involving laboratory procedures to construct the restoration, be it inlay, crown or fixed bridge, are widely used. Of more limited use but no less important are the cold welded golds, namely, gold foil, used generally for one appointment restorations.

FUSED GOLD ALLOYS

When you have made a study of dental amalgam alloys you will see that the greatest weakness of the material is poor edge strength and the inability of the material to protect weakened tooth structures. Under stresses of mastication the material fails at the margins because of brittleness.

If one wishes to restore a large complicated cavity, and have a restoration that is strong enough to withstand the stresses of mastication, the material of choice is gold - of the fused or cast type. Rarely is even a poorly constructed gold inlay a failure because the edges have chipped away, or the restoration break

Inlays, crowns, and bridges are never made of pure 24K. gold because in the pure state it is too soft. Pure gold is combined with silver and copper in varying percentages so that the proper hardness can be obtained. This is called "alloying". When gold is supplied to the dental office it is called "casting gold alloy".

Casting gold alloys are graded and supplied by alphabetical type.

Type A - 22 K.	90% gold	4 - 8% silver
	and	2 - 6% copper

Silver imparts whiteness to the alloy thus improving colour.

Copper produces strength and hardness to the alloy.

This type of gold is the softest material used for small inlays where the occlusal force is not too severe. It is not generally used where protection of weak tooth structure is desired.

Type B - 18 - 20 K.	80% gold	6 - 10% silver
		6 - 12% copper

This gold alloy is slightly harder than Type A golds and is used for larger restorations where more protection to tooth structure is desired. Zinc is sometimes added to reduce the melting point.

Type C - 15 - 18 K. Contains Platinum or palladium in addition to silver and copper to increase the strength and hardness. These alloys are called "high stress golds" and are used generally in the construction of crowns and fixed bridges.

Gold alloys of these types have to be cast because there is no way of cold working the material to construct operative restorations. Casting golds are ordered by Troy weights

i. e.	24 grains = 1 pennyweight
	20 pennyweight = 1 ounce
	12 ounces = 1 pound troy

What should the dental assistant know about the cast gold restoration in order to efficiently aid the dentist in providing a well organized technique? If the commercial laboratory is used for all dental castings, then the technique does not require anything beyond a good impression and model with a sharp wax bite of the opposing arch of the mouth. However should the restoration be cast in the dental office a second pair of hands will be of immeasurable value. All gold castings are made from a wax pattern which accurately fits either the cavity in the patient's tooth or a model of that cavity made from an impression of the tooth.

Direct Inlays - This technique utilizes the actual cavity as the mould. The wax pattern is obtained by inserting and carving the wax directly in the patient's tooth.

Indirect Inlays - This technique requires an impression of the cavity preparation from which a model is made. This model is then used to make a wax pattern from which a cast inlay is made. This is a more popular technique today because it conserves chair time.

Once a wax pattern is obtained the following procedures are followed to obtain a gold casting

Sprueing
Investing
Burning Out
Casting
Pickling

It is recommended that the textbook be referred to for more detailed explanation of these procedures.

SPRUEING - Sticky Wax

In order to form a channel for the melted gold to flow a piece of wire 10-14 gauge in thickness is attached at one end to the greatest bulk of the wax pattern and at the other end to the sprue former. This is done using "stick wax" so that the pattern itself is not distorted by heat. Sprue wires should not exceed one-half inch in length when attached from sprue former to pattern.

INVESTING

You have been thoroughly instructed at this time in the investing technique. There must be no air bubbles in the mix. The investment must completely cover the pattern and the sprue wire. Allow at least 30 minutes setting time.

BURNING OUT

Most dental offices today employ the technique called "thermal expansion". The invested wax pattern in its ring is heated in the electric oven slowly over a period of 1 1/4 to 1 1/2 hours to a temperature of 1250 - 1300 fahrenheit degrees.

CASTING

A quantity of gold is selected which will be of sufficient volume to more than fill the mould of the burnt out wax, sprue hole and end of sprue former. If too much gold is used shrinkage will occur towards the greatest quantity of gold thus drawing gold out of the inlay portion of the mould.

Each time old gold is to be used for casting an inlay it is advisable to add some new gold to replace some of the base metals which burn out during the melting process. Melting temperature of gold is 1725°F. Melt the gold in crucible before placing the ring in the centrifuge. There is no danger then of a cooling off of the ring before casting. When the moulten gold is forced into the mould, allow a 10-15 minute bench cooling period before water cooling the ring and removing the casting.

PICKLING

Commercial pickling solutions are available for removing investment particles and discolouration from the inlay. Heat the casting in a bunsen flame for a few seconds until the gold is a cherry red colour and then immediately plunge the casting into the pickling solution. This acid leaves the gold bright and clean.

Portable sandblasting units are available today which utilize a fine abrasive to actually wear away under compressed air the area of corrosion. While these units are not widely used in dental offices they are used in commercial laboratories and account for the better appearance of their castings.

QUESTIONS AND ANSWERS

1. Why is a Type A casting gold never used for a fixed bridge restoration?

Type A gold is 22K. gold and a small amount of silver and copper. Gold of this type is fairly soft. It is used for the smaller type inlays where not too much force of mastication comes to bear on the restoration. Because of its softness it cannot supply the strength required in the fixed bridge type of restoration.

2. It is usually advisable to judge fairly accurately the amount of gold needed to cast an inlay. Explain briefly what happens if you use
 - (a) too much gold
 - (b) too little gold

Too much gold

Button is larger than restoration.

Gold shrinks on cooling to largest bulk. Shrinkage will be into button and will draw gold out of mould. Casting will probably be short of gold on delicate margins.

Too little gold

There will be no reservoir of gold on the button end of the casting.

Cooling and shrinkage will result in a drawing from the margins of the casting.

LECTURE # 2 - GOLD FOIL

A second form of gold available to the dentist for restoring cavities in teeth is gold foil. This substance differs from cast gold mainly in the manner in which it is used. Gold foil is "cold worked" into the cavity and requires no heat to fuse the molecules as does the cast gold inlay.

Gold foil is introduced into the prepared cavity in small pieces and hammered into all the confines of the cavity with small pluggers. Each additional piece of gold adheres to the former by actual physical union. No heat is necessary for this process which is called "cohesion".

MANUFACTURE

Gold foil is always used in the pure state (i. e. 24K.). Pure gold is cast into ingots and rolled into strips. These strips are then hammered into thin sheets roughly the thickness of tissue paper.

Sheets of gold are selected approximately 4" x 1" weighed and rolled carefully into cylinders. The cylinders are cut into small lengths called "pellets". When gold foil reaches the supplier it is usually in pellet form although full length strips are available.

When ordering gold foil identify the pellet size by number, this number designates the number of grains by weight in the full size sheet from which the pellets have been cut.

It may also be obtained in the form of rolls or cylinders of various diameter.

Pellets during manufacture have been annealed. This is necessary to drive off volatile oils and to soften the gold.

Besides gold foil pellets, foil can be obtained in cohesive or non-cohesive form. As the names suggest it is the ability of gold to cohere or not to cohere which make them differ.

Non-cohesive gold is used generally to line deep cavities where pressure of hammering is undesirable. It is also used to protect delicate cavity margins where pressure of condensation might possibly fracture them. Because of its non-cohesiveness it must be covered with cohesive foil or the restoration would not remain in the cavity. Non-cohesive foil is sometimes called "mat gold".

Cohesive foil because of its ability to adhere to other foil is used to build up and restore completely the prepared cavity.

METHOD OF USE

Rubber dam is essential when using gold foil. The presence of even the smallest amount of moisture will render cohesive foil, non-cohesive.

Gold foil preparations must be filled completely in one appointment because once the Dam is removed the surface of the foil becomes contaminated and no more foil will adhere to it. Small pellets are first introduced into the cavity and either hand malleted to place or driven to place with a spring loaded mallet or

pneumatic mallet. This process is called "condensation". The assistant is often called upon to handle the hand mallet which strikes the condensor held in the correct position by the dentist. After each piece of foil has been condensed additional pieces are added and condensed until the cavity is filled. Several dozen pellets are required for even the small cavity preparation. Condensor points vary in size and shape depending on location and size of cavity. Usually several different sized points are used for one restoration.

Sometimes gold foil which has been exposed to air for a long period of time, or even stored for several months becomes contaminated on the surface by air borne gases, when this occurs the foil loses some of its cohesiveness. It can be rendered cohesive again by gently heating the pellets on a sheet of mica over an alcohol flame. Avoid the use of a natural gas flame because of the presence of sulphur in the gas which reacts with gold. Care must be exercised not to overheat the gold, since overheating can actually melt it. Heating gold gently drives off the volatile contaminants. Gold foil is best stored in tightly stoppered glass vials.

When setting up the instruments for a gold foil operation it is necessary to remember that gold foil must never be touched by hand, and advisable not to handle the pellets with cotton pliers. Moisture destroys cohesiveness, plier pressure can compress the pellet and destroy some of the working properties. A clean glass slab or clean glass dappen dish are the best containers for gold foil. All gold foil instruments and condensor points should be clean and dry. The alcohol lamp should be lighted and left on the bracket table, should it be necessary to anneal the foil or dry a specific instrument at any time during the operation.

QUESTIONS AND ANSWERS

1. Why is a rubber dam always used for the gold foil operation?

Gold foil has as its most important property, cohesiveness. Moisture in the slightest form will destroy this cohesiveness, rendering the material unworkable. The rubber dam prevents moisture contamination both from saliva and breath.

2. How is gold foil supplied by the manufacturer to the dentist?

In ropes or cylinders

In pellet form numbered by weight (Troy) e. g. The number of grains in each sheet or cylinder before the pellets are cut.

Ropes, cylinders and pellets are cohesive in form.
Non-cohesive or mat gold.

RUBBER BASE AND SILICONE IMPRESSION MATERIALS

While many excellent materials and techniques have been available in the past few years for obtaining accurate impressions of cavity preparations for fixed bridges, crowns and individual inlays, the manufacturers of dental supplies have developed new materials and techniques for this operation. Busy practices and high speed cavity preparations have made the two-appointment gold restoration a must in the dental office. The dentist has always looked with favour upon a technique which embraces both ease of execution and accuracy in operative procedures. The use of rubber base and silicone impression materials is not suggested to convey the idea that these materials are better than some of the older proven substances, but to many practitioners they do meet the requirements of each of handling and accuracy.

RUBBER BASE IMPRESSION MATERIALS

These materials have as a base, "thiocol rubber" and are sometimes called "elastic latex". They are supplied in collapsible tubes like tooth-paste, one tube containing the base material in pasteform, and the other the catalyst also in paste form. Until the base and catalyst are mixed together these pastes remain plastic, but on combination a chemical process occurs slowly which ends when the mass assumes a rigid but elastic form. No special equipment is required for this material. It can be mixed with a tongue depressor on a paper pad and will be ready for use. Some techniques use a special syringe for introducing the material into deep or complicated cavity preparations.

Manufacturers supply this material in two or three forms, syringe type, or light consistency, medium or regular consistency, and heavy or tray consistency.

Syringe Type

This is the lightest consistency material available and is used in a special syringe where it can be injected in small quantities into deep details of cavity preparations. Because of its light consistency it is never used alone for an impression owing to the danger of tearing when the impression is removed.

Medium or Regular Type

This is an intermediate material slightly heavier in consistency than syringe type, but not as heavy as the tray type. Many dentists use this consistency exclusively because it will both flow from a syringe, and provide fair bulk for use in a tray. This will permit an impression of any quadrant of the mouth with a single mix of the material.

Tray or Heavy Type

The consistency of this material is too heavy to flow from a syringe, or to even flow into many cavity preparations. It is used generally in conjunction with syringe type material to provide the body of the impression and support the more delicate syringe type material from distortion or tearing when the impression is removed from the mouth. Tray type material can also be used in conjunction with regular type material in the same manner.

SILICONE IMPRESSION MATERIALS

A second type of impression material while chemically different from the thiocol rubber material, is the silicone impression material. It consists of basic synthetic rubber with one of the new compounds of silicone in its formulation.

It also is supplied in collapsible tubes in a base and catalyst form. Combination of the two pastes initiates the chemical reaction which terminates when the mass has reached a rigid but elastic form. As yet this material is supplied in only one consistency but can be used in both a syringe and tray. It compares in consistency with regular type rubber base material. It is more pleasant in taste and in odour than rubber base material but some practitioners feel that as yet it does not compare too favourably with rubber base material as to accuracy and shelf life.

It is suggested by the manufacturers of both these materials that impressions requiring large quantities of material will not be as accurate as those with less volume. This is conceivable since the nature of the material might cause distortion due to elastic qualities. For this reason it is suggested that a custom tray be made for each individual case.

THE IMPRESSION TRAY

These trays can be made from quick-curing plastic tray material provided by several manufacturers. Trays are made either directly in the mouth, or from a model made by taking an alginate impression of the mouth. Two thicknesses of baseplate wax are adapted over the teeth only, and the tray is made by covering this wax and ridge with self-curing plastic.

When the tray is cured, it is taken from the mouth or model and the wax removed. This wax is a fairly close guide for the amount of material (impression) needed for the reproduction. Because both rubber base and silicone impression materials are rather costly items it is advisable to gauge the correct amount needed for each operation. As previously mentioned the wax which has been removed becomes a fair guide as to how much material to use. After the tray has cured completely it may be necessary to remove rough edges with the arbor band on the dental lathe.

Most manufacturers supply a plastic adhesive to coat the inside of the plastic tray. While this material is not absolutely necessary, it will assure a better bond between the plastic and the impression material. Small holes, cut into the tray will further assure bonding.

PREPARING A MIX

The mixing of both rubber base and silicone materials is essentially the same, except in the case where the impression requires a mix of two different consistency materials. In this case only the rubber base material should be used.

Squeeze out the required volume of base material on a paper pad. Squeeze out the same length of catalyst on the same paper pad. If too much catalyst is used, the set of the mix is retarded. A clean plaster spatula or tongue depressor is used to combine the two materials. Those manufacturers who have coloured the base material and catalyst differently have a more workable material because mixing is complete when the whole mass reaches a uniform colour. The experienced assistant can do this in one minute or less. Those materials where catalyst and base material are of a similar colour are much more difficult to handle because the final colour of the mix differs only slightly from the colours of the components.

If syringe or light material is used, the syringe must then be loaded. The technique of loading a syringe with either the rubber base or silicone material is unique and is best shown in a visual demonstration. When the dentist has ejected the light material into the areas of choice he will require the tray containing the regular or heavy material. As this operation must be completed before the syringe material has set, the assistant must immediately commence the second mix while the dentist is ejecting the first from the syringe. Perfect timing is required in this technique as in the hydracalloid technique. The impression is allowed to set for a period of approximately ten minutes, and is then removed from the mouth.

While the manufacturer of both rubber base and silicone impression materials claims there is no distortion of the finished impression if it is either stored in water or left in air for a long period time, it is advisable to pour a model from it immediately.

The dental profession has for so many years been warned of the dimensional changes in impressions left unpoured, that it has become no problem to assume that perhaps this can occur with these newer materials. Dies are best made with compositions such as Vel Mix, Duroc, etc.

QUESTIONS AND ANSWERS

1. Briefly outline the technique of handling an impression of the lower left quadrant of the mouth using "regular type" rubber base material.

Construct tray of quick-curing plastic and supply 2 sheets of base-plate wax. Coat inside of tray with adhesive. Set out impression material, paper pad, spatula or tongue depressor.

Using wax liner of tray as a guide squeeze out required amount of regular rubber base material.

Squeeze out an equal length of catalyst.

Mix thoroughly for not more than one minute.

Fill tray and hand to dentist.

While impression is setting commence the mix of the die material so that it may be poured as soon as the impression is removed from the mouth.

2. When is the best time to pour a model from a silicone impression? Why?

Immediately - Because of the possible dimensional change in any impression material it is unwise to court distortion of the model by allowing it to dry in air or lie in water.

Silver amalgam is the most common all-purpose posterior filling material used in dentistry. It is found to be readily manipulated, and well tolerated by mouth fluids and tooth structure. When properly handled by dentist and dental assistant, it exhibits excellent qualities of strength colour, flow, hardness, lack of dimensional change, and reasonable setting time. Strength is a term denoting its resistance to breakage. Flow is a term showing its tendency to change shape. Hardness is a term denoting its resistance to scratching. Dimensional change is a term denoting its ability to expand or contract.

An amalgam is a special type of alloy in that one of its constituents is mercury. An alloy is a metal formed by blending two or more metals while in their molten state. Inasmuch as mercury is liquid, or "molten", at room temperatures, its alloying with other metals can be accomplished with the latter in a solid state. This particular process of alloying is called amalgamation.

The metal alloyed with mercury for dental purposes is in itself, an alloy of silver, tin, copper, and zinc and is known as the dental amalgam alloy. The American Dental Association has certified as acceptable, all dental amalgam alloys that meet its requirements with regard to content, expansion, contraction, setting time, etc. The composition requirements are; silver, 65% minimum, copper 6% maximum, tin, 25% minimum, zinc, 2% maximum.

The silver content contributes to the alloy strength, resistance to tarnish, and decreased flow. It is an expanding influence.

The tin content with its great affinity for mercury, reduces amalgamation time and its contracting influence acts as a balance for the silver.

The copper content is an expanding influence and is used to increase the strength and hardness of the amalgam and to reduce its flow.

The zinc content is small since it is a weakening factor, but is used to increase the workability and cleanliness of the amalgam by combining with oxygen more readily than any of the other ingredients (tin oxide being undesirable).

The manufacturer must ensure that these metals are pure and alloyed properly. He then grinds up or "mills" this ingot into tiny particles and then carefully "heat treats" these particles to make them readily workable. It is primarily in the particle size and heat treatment process that one dental amalgam alloy will differ from another in working properties. The dentist will then select the brand of A. D. A. approved alloy and the particle size that afford him the manipulation properties most congenial with his technique.

Dental mercury is not alloyed with any other metal during its manufacture and is therefore chosen for its high degree of purity. The term U. S. P. is the only one of significance in denoting this purity.

MANIPULATION

Proportioning the Mercury and Alloy

The proportions by weight of the mercury and alloy to be used are generally expressed as the alloy-mercury ratio. Each manufacturer supplies the recommended alloy-mercury ratio in the literature accompanying this alloy, and they should be followed as closely as possible. The average alloy-mercury ratio is 5:8 by weight, and is not critical provided that there is a slight excess of mercury in the freshly mixed amalgam. Insufficient mercury during amalgamation reduces the strength of the amalgam and may produce an expanding restoration. If a large excess of mercury is used during amalgamation, more mercury may be retained in the restoration with resultant decreased strength and increased expansion.

Proportioning by weight may be done using dental scales. While this is highly recommended and if done with care is the most accurate method, many offices find the use of scales to be painstaking and more vulnerable to inaccuracy when operating on a tight time schedule. Proportioning by volume using mercury and alloy gauges is found to be more popular and provided care is taken, is reasonably accurate in a fast technique. When proportioning with the latter technique, the most common fault is in failing to ensure that the measuring chamber of the gauge, is completely filled with alloy particles before spilling out the measure. This is corrected by tapping the gauge sharply before each spill. The proper amount of mercury and alloy must be measured prior to trituration since the subsequent addition of mercury will weaken the amalgam.

Trituration of amalgam is carried out by (a) hand method using mortar and pestle or (b) using a mechanical amalgamator.

- (a) Mortar and Pestle. Since the object of trituration is to bring the mercury and alloy into intimate contact so as to allow amalgamation, an accurately fitting mortar and pestle should be selected of a shape and ground surface that will confine these ingredients. This fitting of mortar and pestle may be completed by grinding a paste of FFF carborundum and water until the dried surface of the mortar is uniformly abraded in appearance. As this surface gradually wears smooth with use, it should be reabraded periodically.

When the proportioned alloy and mercury have been placed in the mortar, the pestle should then be manipulated at a speed and for a length of time according to the manufacturer's directions. The pestle should be held with a pen grasp to ensure light pressure so as to avoid heat, extreme altering of the particle size, and over-trituration. A pestle held in a fist grip will probably carry much of the weight of the arms and shoulders and will result in excess triturating pressure.

Trituration should proceed until the mixture smooths out and adheres to the wall of the mortar (approximately 1 minute). To proceed further would result in over-trituration. At this point, if all factors are correct, the mass should be completely homogeneous. This homogeneity is essential, and if in doubt, the mass should then be transferred to a rubber finger stall or a piece of rubber dam for a brief period of mulling to complete amalgamation. It should be noted that once amalgamation is started, no moisture from any source may be allowed to reach the amalgam until the initial set of the restoration is complete. For this reason, the fresh amalgam should never be touched by fingers or mulled in the open hand, since the resultant contamination by perspiration causes delayed expansion and pitting in the finished restoration.

Since the expression of free mercury from freshly mixed amalgam hastens its set, it is desirable if making a large mix to delay the set of the bulk of the mix while condensing the first portion. The completely amalgamated mass, therefore, is rolled into a cylinder about 1/8 inch in diameter and divided into three or four portions. Each of these portions is picked up with cotton pliers when required, placed in a clean gauze squeeze cloth, and the excess mercury squeezed out. The amount of mercury removed by the dental assistant will be in accordance with the working qualities required of the amalgam by the dentist. The mercury-poor amalgam is then placed in a dappen dish where it is confined for easy loading of the amalgam carrier. The loaded amalgam carrier is then passed to the dentist by slapping it in the palm of his outstretched hand in a position ready for use in the mouth. On retrieving the carrier from the dentist, the assistant should snatch it from his hand. This positive transfer of instruments between dentist and assistant greatly facilitates the exchange of the amalgam carrier. When the first portion has been consumed, the second portion may then be squeezed, for use and the procedure repeated until the restoration is completed. Speed is desirable at this point so that the amalgam may be condensed in the tooth prior to the start of its initial set.

- (b) Mechanical Amalgamation. The other method of amalgamating the alloy and mercury is through the use of a mechanical amalgamator. There are several types available, the most common one is named a Wig-l-bug. It consists of a capsule (the mortar) with a small cylindrical pestle, mounted in a rapidly vibrating arm that is set in motion by a timer switch. The measure of alloy and mercury is placed in the capsule, the small pestle added, the capsule is capped and placed in the vibrator arm. The timer switch is set for from 7 to 20 seconds, depending on the size of the mix, the speed of that particular machine, and the strength of the current. Some experimentation is required to determine the minimum trituration time required to render a specific size of mix completely homogeneous or smooth. Undertrituration will produce a weakened, expanding restoration

while overtrituration may produce shrinkage during hardening. Since the trituration time is considerably shorter with the mechanical amalgamator than with the mortar and pestle, more care is needed to avoid these hazards. There are some outstanding advantages to be noted in the use of a mechanical amalgamator; (1) amalgamation is more uniform from mix to mix - in other words, the human factor is eliminated. (2) trituration time is reduced from 1 minute to a few seconds. Thus, instead of making one large mix for a complex restoration, dividing it into three or four sections and expressing the mercury from each section in turn, many small mixes may be made and each expressed in its entirety. Free mercury is readily expressed from a fresh mix, but once crystallization begins, is not so readily or completely liberated. Care should be taken to ensure that all amalgam is removed from the capsule and squeeze cloth, for if it hardens in these areas, it may contaminate a subsequent mix resulting in a faulty margin or discoloured restoration. An amalgamator capsule may be ruined through the removal of hardened amalgam resulting in a scratched wall that will harbour future bits of amalgam. Therefore, be sure that the capsule is clear after each mix and if not, clear it with a small bristle brush.

CONDENSATION

The purpose of condensation of the amalgam within the cavity is to force the amalgam particles as closely together as possible and at the same time, to remove the remaining free mercury. This procedure increases the strength of the restoration and decreases flow. Expansion is decreased as the mercury is removed. It is imperative that the operating field be completely dry at this stage, for moisture contamination from saliva, tissue edema, or gingival haemorrhage will result in delayed expansion, pitting and discoloration, and eventual failure of the restoration. To this end, a rubber dam or cotton rolls are used.

When the squeezed amalgam is passed to the operator, he places it in the cavity and condenses it with heavy hand pressure against the cavity floor and walls. While there should not be a large excess of mercury evident at this point, there must be sufficient free mercury brought to the surface to bond this amalgam with the subsequent increment. Each subsequent increment then, is condensed downwards against the cavity seat, and outwards against the cavity walls with any large excess of mercury so produced removed prior to the next addition of amalgam. This is repeated until the cavity is completely filled and amalgam is then further packed into excess in an attempt to bring as much mercury as possible up beyond the confines of the cavity. Sufficient time is then allowed for the initial set to take place before starting carving (approximately 3 to 5 minutes).

There is an alternative technique for condensation using a mechanical condenser called a Hollenbeck Pneumatic Mallet. This is a small pneumatically operated hand piece with an assortment of interchangeable points that allows one's condensing hand pressure to be supplemented with a rapid blow. This offers some advantages that many dentists find desirable.

MATRICES

Because of the heavy pressure used in condensing amalgam, the operation must be confined within four walls and a floor. If one or more of these cavity walls are missing, a form or matrix must be constructed to act as a substitute wall. This matrix is usually .002 stainless steel banding material and may be used in conjunction with a matrix retainer. The matrix retainer is a mechanical device used to hold this band tightly around the tooth so as to confine the condensing amalgam and to impart to the restoration the shape of the lost tooth structure. There are various designs of matrix retainers available on the market, each dentist having his own favourite. The dental assistant should see that the matrix band is removed following use, sterilized, re-shaped or discarded according to its condition, and placed in a separate location for easy and rapid selection prior to its next application.

Some amalgam techniques further reinforce this matrix by placing a hardwood wedge between the approximating teeth and may even encase the entire matrix in dental compound. These precautions are taken to increase the rigidity of the matrix so that increased condensing pressure may be applied when inserting the filling. When the initial set of the amalgam has taken place, care is taken by the dentist in removing the matrix to avoid breaking or cracking the new restoration.

Amalgam Condensers or Pluggers are hand instruments with the working point terminating in a flat surface that may have a round, oval, rectangular, etc. shape. The surface may be flat or serrated. If serrated, it should be checked by the assistant to ensure no residual amalgam could be retained to be incorporated in a subsequent restoration and produce the harmful effects previously noted.

Amalgam Carriers are the instruments used to convey the freshly mixed amalgam into cavities and are of a tube and plunger design. Several makes are available and the assistant should make sure the carrier is free of old amalgam before loading since this can be another source of contamination of one amalgam with another. Any residue may be removed by heating the tip of the tube briefly to soften the hard amalgam and then forcibly expelling the plunger.

Carving is the removal of all silver amalgam lying beyond the confines of the cavity preparation, and thereproduction of lost tooth form. It is accomplished with a carver or hand instrument whose working point is a shaped blade. Carving should not be started until the initial set of the amalgam has taken place, which may be judged by the resistance offered by the amalgam to the blade. Some dentists prefer a burnishing technique to a carving one and do so by smoothing the amalgam surface with a burnisher. A burnisher is a hand instrument with the working point quite large and rounded (ballshaped, egg shaped, beaver tail, etc.)

The patient is instructed to avoid eating on a new amalgam surface for 24 hours so that the danger of fracture may be avoided while the amalgam is hardening.

Polishing is the process of rendering the amalgam surface perfectly smooth, and continuous with the tooth structure. Since the final set of amalgam takes place over a considerable period of time, polishing should be delayed for at least 24 hours following insertion, and preferably one week. The margins may be finished with diamond stones, finishing burs, or fine sandpaper discs. The metal surface is then polished using a rotary rubber polishing cup or bristle brush, with a loose mix of pumice and water or silex and water as an abrasive. When all scratches have been removed from the metal surface, the mouth is flushed and the process repeated using whiting and water or tin oxide as the final polish. Care must be exercised to avoid excess pressure during the polishing or having too dry a mix of abrasive since in both instances heat is produced on the surface of the restoration. This heat production draws mercury up to the surface leaving the restoration temporarily shiny, but with weakened mercury-rich margins.

The smoother and more homogeneous the amalgam surface, the greater the resistance to tarnish and corrosion.

CAUSES OF FAILURE IN SILVER AMALGAM RESTORATIONS

1. Incorporation of old amalgam in a new mix may result in a faulty margin or discolored restoration. Carefully check the mortar, squeeze cloth, amalgam carrier, and serrated pluggers for old amalgam.
2. Incorrect proportioning. Too little mercury will produce a weak restoration. Too much mercury will produce a restoration of decreased strength and increased flow. Additional mercury added during amalgamation will decrease the strength of the restoration.
3. Insufficient trituration produces a weakened, expanding amalgam.
4. Excess trituration produces shrinkage during hardening.
5. Moisture contamination (extra-orally due to handling with the fingers, or intraorally due to saliva, blood, or edema contamination) will produce delayed expansion and pitting in the restoration.
6. Insufficient mercury expression in the squeeze cloth leaves the amalgam plashy and hard to condense, probably resulting in a higher mercury content in the finished restoration with resultant delayed expansion and decreased strength.

7. Excess expression of mercury in a squeeze cloth may not leave sufficient mercury in the amalgam to bond one increment to another with resultant flaking away of a portion of the restoration at some time in the future.
8. Insufficient condensation will inadequately compress the amalgam and will leave too high a mercury content in the finished restoration. Such a restoration will show delayed expansion, decreased strength, decreased hardness, and increased flow. Insufficient condensation may be the result of a poor matrix, inadequate condensing pressure, and too broad a point on the condensing instrument.
9. Insufficient over-packing. It is desirable to draw the free mercury up beyond the confines of the cavity into a removable excess.
10. Incorrect carving will fail to remove that silver amalgam lying outside of the cavity preparation which, since unsupported, will eventually chip away.
11. Failure to polish the amalgam surface will leave it granular in texture and prone to corrode and discolour.
12. Heat production may be produced during polishing due to an excess of pressure on the rotary rubber cup or brush, or too dry a polishing paste. This will draw mercury up to the surface of the restoration leaving the surface and marginal amalgam with an undesirable high mercury content.
13. Incorrect cavity preparation. If there is an inadequate bulk of amalgam, or if it is not properly supported, it is subject to fracture.

It will be noted that the first seven of the above causes of failure lie directly in the province of the dental assistant. Careful attention to these details will make the dental assistant a full partner in the successful construction of silver amalgam restorations.

The subject we are about to discuss may well be the least exciting but most important phase of your duties as chair assistant. You will be dealing directly with these materials every day and since, as we shall see, the final properties depend to a great extent on the manipulation and mixing, you influence for good or bad the final product of the cement. I believe there is more confusion and misunderstanding between assistant and dentist because of cements than any other phase of chair assisting. This is especially noticeable if you change partners. The second fellow may seem to require mixes totally different from the first. To obtain harmony and efficiency with the best results for the patient, it is necessary for both parties to know something of the behaviour of cements under given conditions and to know exactly why it is being used (specific purpose). It is not fair to ask a dental assistant for a thick mix or a thin mix. How thick or how thin? It would be better for her to know that the purpose is to line a deep cavity in an upper tooth, etc. Therefore this little discourse has been designed to explain in simple terms what a dental cement is; for what purposes it is used; and how a standard result may be obtained yet the working qualities altered through changes in mixing techniques.

I am going to observe two rules. I shall refrain, as much as possible, from using trade names. If I do happen to use one it is not to be construed as one product being superior to another. I may be more familiar with one product because of continued use. Your dentist may have good reason for using another. All of the products are basically the same, and must pass Bureau of Standards tests in order to be marketed. I shall use generic or broad terms to describe them wherever possible.

I shall refrain from getting too technical. You are not interested in chemical explanations and I am not trained to judge them from this standpoint.

What do you think of when you use the term cement. The dictionary says cement is from the Latin "caementum" (stone clippings) is any substance which makes bodies stick together; or a strong kind of mortar. I want you to forget the first definition. Dental cements have no adhesive power. They don't stick anything together as we shall see later. Dental cements are somewhat like mortar or the cement we know of on sidewalks or the end product of minute chips held together in a mass to produce a relatively hard inert substance.

Dental cements cover a wide range of products of a family that have in common the feature that they are produced from a union of powder and liquid brought together on a slab with a spatula.

The different members of this family diverge at this point and bear little relation to one another.

1. In the manner in which they unite.
2. In the physical properties they exhibit.
3. In the end product that results.

In fact we shall see that in some operations we use two or three different types of dental cements, the one to protect the sick tooth from the ill effects of another.

We use dental cements because they can be adapted to the small areas of teeth easily while they are in a plastic state and because they harden quickly in any given form.

Different members of this family are used for different purposes because of the peculiar properties each exhibits.

Dental cements can be used as

1. Permanent fillings
2. Temporary fillings, (to enable the sick tooth to recover)
3. Linings for metal fillings (to protect the sick tooth from shock both thermal and physical)
4. To fix prosthetic appliances (inlays, bridges, orthodontics etc.)

The first group we might consider is the zinc oxyphosphate cements. There are many products of different manufacturers included in this group, all basically the same.

Mizzy, Caulk, S.S. W., Ames (Denco temporary) etc.

The powder is composed chiefly of ZnO (zinc oxide). This is stable and has a long shelf life.

The liquid consists of phosphates, water and orthophosphoric acid, in a fine balance to achieve a consistent and practical setting time. Any change in the water acid rates will change the setting time, therefore it is desirable to protect this liquid from atmospheric conditions (e.g. oil, storage, proper stopper etc.) and to discard the liquid before too much evaporation takes place.

This cement is highly versatile and can be used for a great many purposes. It is fairly strong and resistant to erosion. It has a practical working time which can be lengthened or shortened by manipulation. It is mildly irritating which might preclude its use in deep cavities or sick teeth.

It is a non-conductor of thermal change. Since it can be spread very thin with minimum of displacement it can be used to fix inlays or prosthetic appliances.

When the powder is brought into contact with the liquid a chemical reaction takes place whereby there is a solution of powder particles. As with all chemical reactions heat is produced. If the mixing is too hurried or too great amounts of powder added the reaction is speeded up creating a faster setting time and producing great amounts of heat. Obviously then in dealing with the delicate dentine near the pulp of a tooth heat is to be avoided. At the same time we must avoid the retention of free acid by undermixing. This too can be harmful to tooth tissue. You see while the reaction is going on we are applying the cement for our purpose. Where the cement hardens the reaction is complete. So the object is to have the maximum working qualities and the minimum harmful side products while the reaction is taking place.

It is possible then and necessary too, for the dental assistant to lengthen the time of set and allow the dentist more time to work without loss of strength. (e. g. Bridge or long splint versus inlay) (Trying to cope with an upper tooth vs. a lower tooth) (The problem of saliva control) (Flowing over a weak soft liner as against pushing or forcing a temporary filling). Where you are setting a splint you need time to work therefore you wish the cement to set slowly. If you are working in an area where moisture is a threat speed of set may be an advantage. Working in an upper tooth may require a different consistency from that which would be required for a lower tooth. The dental assistant therefore must know what conditions the dentist is working with in order to produce the desired consistency.

Factors which control the time of set

Length of mixing -

Addition of powder to liquid -

Spatulation -

Temperature of equipment -

Demonstration of mixes (for linings Ames cement
 (for temporary fillings
 (for cementation
 (addition of eugenol
 (addition of alloy powder

Cleaning equipment

Closely related to this family is the copper phosphate cements rarely used now. There is a red and black copper cement sold and the copper was supposed to have bacterical properties which of late are doubted. Their colour precludes their use in a lot of cases. The mix is very similar to the zinc cements.

The next family we might consider is the so-called zinc oxide group. Included in this are such products as zinc oxide and eugenol, pulprotex, cavitex, etc. The zinc oxide is merely a vehicle for the eugenol. Some of these products have zinc acetate which hastens hardening and resin to produce more desirable working qualities. At any rate there is no reaction (chemical) here so that apart from thoroughly working the powder into the liquid the manner in which it is done is unimportant. The consistency of the mix is dictated by the purpose for which it is required.

These cements are used for dressings for tooth-aches. They are used as temporary fillings in areas where bulk displacement is required under gingival tissue.

They are used as liners for cavities which are deep and near pulp tissue but not over exposed pulps. While they are bland, soothing and not irritating they do not promote healing or bridging. Since they are not strong they must be protected by zinc oxyphosphate cements against pressure of amalgam. They are not used directly under silicate cements or resins since they discolour the silicate and upset the polymerization of resins.

The final members of cement family we shall consider this evening is the calcium hydroxide group. This is a very useful and common material used as a lining over very deep cavities and exposed pulp areas. It is used in pulpotomy where e.g. children's deciduous teeth part of the pulp is removed. Calcium hydroxide may be mixed with distilled water which renders it in a condition to place it over the tender area. The material hardens slightly and promotes healing.

Jodo-formagen is a product which employs calcium hydroxide.

Again the method of mix is unimportant but the consistency is all important. It must be very soft and be such that it can be transferred to the tooth area expeditiously.

Silicate Cements

Silicate cements are widely used as so-called permanent fillings because they possess certain properties not found in other materials. The main reason for its use is to produce an aesthetic effect by reproducing the natural colour of tooth enamel. A minor reason is that its plastic state enables it to be inserted with a minimum of destruction of tooth tissue for access purposes. Their properties as a tooth restorer are not as good as metal hence their use is limited to anterior teeth where appearance is a major factor. Silicates are harder than other types of cement and more resistant to erosion. The difficulty lies in the control of many variables many of which depend on mixing techniques, therefore this material is important to you.

A silicate takes a long time to achieve its final physical properties (note change by manufacturers). Like anything in this life, final success depends a great deal on the right start. A child with good family and moral background grows up to resist the pressures of life which tend to erode his character.

A silicate, properly mixed and inserted has enough good properties to resist discolouration from lipstick, tobacco etc. and erosion from moisture and stress. We shall not deal with factors which the dentist must consider (mouth conditions, location and size of the cavity, moisture control, protection etc.) but we should know something of the character of silicate that we might mix it intelligently in order to preserve its best properties.

Silicate cements are made by manufacturers and are being constantly changed and improved. Basically though they are all of the same composition.

Powder - silica calcium compounds and alumina.

Cryolite and phosphates are added to give properties suited to dentistry.

Liquid - phosphoric acid, water and aluminum and zinc salts.

Silicate should be stored in a clean place away from drugs or oils such as eugenol.

The shade of a powder can be changed by contamination of 1 part in 100,000.

Here again the water acid ratio of the liquid must be maintained in order to prevent change of setting time. Atmospheric conditions will affect this balance if the bottle remains unstoppered too long. Most silicate liquids are produced to remain stable at a relative humidity of 80%. The addition of water will hasten setting time. Loss of moisture slows setting time e.g. (hot dry climate).

This material closely resembles Portland cement or our idea of building cement. It differs from the cements we have already discussed in that when the liquid and powder are combined the liquid attacks the surface only of the powder particles but does not dissolve them. A cross-section of hardened cement has somewhat the appearance of concrete. The undissolved powder particles are bound together by the reaction product of the powder and liquid. This product, the matrix of the silicate cement is a non-crystalline gel-like material and is thought to be silica acid gel. This is much like the non-reversible action of jello.

Some lessons we learn from such a reaction

1. There is little chemical reaction hence no heat is produced.
2. The gel is colourless and has little strength of its own. The powder particles possess colour and strength, therefore it is desirable to have the maximum amount of powder and a minimum amount of gel to produce a consistent mass.
3. Since a colloidal action provides for water storage within its mass in a state of balance, addition of moisture before the initial set would be harmful as would loss of moisture after this time.

In the light of these conclusions, our rules for mixing might make some sense.

1. Mix It Quickly

The colloidal action starts about 1 minute after the powder is wet by the liquid. Since the mass should not be disturbed from this point we must mix and place the filling during this time. Obviously then a 30 or 45 second mix is necessary to give the dentist time to do his part of the job.

A quick mix of silicate does not produce heat which would be harmful to the tooth.

2. Mix with Cool Equipment

Any reaction is retarded with cold and speeded with heat. A cool slab and spatula will give the maximum amount of time possible to work the mix. There is a limit to this cooling however because cooling below the dew point allows condensation of moisture on the slab which would interfere with the time of set and the physical properties.

3. Mix It Thick

The degree of thickness will vary with different silicates. In the main, a dough-like consistency should be produced having a sheen of moisture apparent on the surface. Decreasing the powder liquid ratio will decrease the compression strength of the mass. We wish to have the maximum amount of powder wet by a given quantity of liquid.

All spatulas should be stainless or agate and the slabs should be clean. A slab containing a thermometer is best.

SELF-CURING RESINS

The last material I might mention, while it is not of the cement family but

rather the plastic variety is the self-curing resin.

This material has been designed to do work similar to that of silicates and while its properties are not exact enough yet I believe in time it will displace silicate.

While it has some advantageous properties - colour, stability, lack of solubility, less irritation to tooth tissue, it does not appear to have enough dimensional stability. These materials depend upon heat for polymerization and this heat is triggered within themselves. Some differences in mixing can be noted.

The liquid is generally added to the powder.

Spatulation is unnecessary.

An excess of liquid is preferable and the whole process should be done in as nearly one operation as possible.

The degree of working thickness depends on the job to be done. When the snap set has occurred the action is complete and the material inert.

Definition of Crown & Bridge Prosthodontics: The technology of replacing missing teeth with fixed replacements i. e. pontics or false teeth are attached to remaining natural teeth by means of fixed retainers (attachments). These replacements harmonize with the physiologic and anatomic concepts of the parts involved.

Fixed prostheses - restore

- (1) Function - anterior and posterior - mastication
- (2) Aesthetics - anterior and bicuspid regions
- (3) Stability - (i) fixed bridge splint with no teeth lost (ii) prevents drifting of retainer teeth or exfoliation. This aids in
- (4) Prevention of gross periodontal damage.
- (5) Dental arch form for better comfort and efficiency.

It is generally accepted that fixed bridges are indicated whenever there are properly distributed healthy teeth to serve as abutments. Shown by X-ray and oral examination. Such restorations are the third line of defence against full dentures, being preceded - not necessarily in importance, but chronologically - by Operative Dentistry and Periodontics.

From the standpoint of health, natural function, appearance and lasting qualities the fixed bridge is the easiest replacement to care for, comes nearer to satisfying the patient's pride and peace of mind and seems more nearly a part of his natural chewing mechanism than a removeable appliance. With existing techniques it is now possible for a dentist of only average ability to construct very satisfactory crown and bridgework.

The number of fixed bridges that dentists are operating each year in their offices is increasing at a very rapid rate as is the demand. This has placed this type of dentistry more in the public eye and by virtue of its precise detailed and energy consuming techniques, handled by the operator - the role of the dental assistant, both chair side and in the laboratory is becoming increasingly more important.

With the help of the Dental Assistant the operator's time is used to better advantage with the more meticulous and intricate operative procedures involved in crown and bridgework.

Dental assistance may be given -

- (a) In the operatory - preparatory to impression taking
 - (i) Copper bands and materials readied.
 - (ii) Hydrocolloids, silicones, thiokol or rubber-base impression material available for tray technique.

(iii) Availability of materials for gingival retraction.

(b) At the chairside -

- (i) Aid in rubber dam placement
- (ii) Handing of instruments to operator
- (iii) Direction of power suction tip
- (iv) Proper and careful handling of impression material
- ** (v) Sympathetic, reassuring and understanding manner to help ease the tension under which most crown and bridgework is carried out both to patient and to dentist alike.
- (vi) Assistants (assistance) without hesitation is a prime requisite. A moment's delay may lead to uncertainty in the patient's mind.

(c) In the laboratory -

- (i) Pour up opposing arch impression and initial impressions for study models.
- (ii) Pour up amalgam dies - copper bands.
- (iii) Invest inlay patterns and cast the patterns
- (iv) Preparation of "quick-cure" acrylic trays from study models when silicone or rubber base impressions are taken
- (v) Preparation of hydrocolloid in boiling and tempering baths etc.
- (vi) Remove facings and old cement from old bridges prior to recementation.
- (vii) Preparation of temporary splints or acrylic bridges.

(d) Important. The strict maintenance of all crown and bridgework supplies - impression materials, temporary crowns (aluminum or clear plastic) medicaments etc.

IMPRESSION TECHNIQUES

A. Copper band - materials used.

- (1) Copper bands
- (2) Greenstick or red tracing compound
- (3) Bowl of warm water
- (4) Festooning pliers
- (5) Small curved cutting shears
- (6) Scotch tape or masking tape
- (7) Silver amalgam or die stone
- (8) Plating equipment
- (9) Inlay wax - green, blue, black, etc.
- (10) Plaster index to relate inlays in mouth

B. Using impressions of dental arch and prepared abutment teeth. Tray Method.

1. Reversible agar hydrocolloids e.g. Surgident, Dentocall, Kerr's etc. are thermal controlled water cooled from fluid to gel in 4-5 minutes by flowing cold water through a water-cooled tray, fitted previously to study models. Turn water off for last 1 - 1 1/2 minutes to eliminate thermal shock. Most important is the proper boiling and tempering of syringe and tray material in conditioner beforehand. The impression is immersed in 2% potassium sulphate solution 5 - 10 minutes before pouring dies in Duroc or Velmix stone.
11. Rubber-base (Thiokol) impression material - and adjuncts supplied by manufacturer. Custom fitted acrylic tray or any other type prepared tray e.g. plaster which must give a thickness of 2-3 m.m. of material over the prepared teeth. Pour up cast within one hour.
111. Silicone impression material and adjuncts supplied by manufacturer. Custom trays as with 11. Pouring time determined by gases released.

Silicones and rubber-base material are coming into more frequent use due to their easier handling by assistant and operator. Both have two mixing techniques (a) single mix - load tray, and load syringe or wipe abutment teeth and seat tray. (b) double mix (the better of the two methods). Assistant and operator each handle one phase (i) syringe mix - thinner and slower set. (ii) tray mix - deuser or heavier body and faster set.

The final set is reached in approximately 10 minutes.

The setting of rubber-base material is irreversible and chemically controlled by means of a catalyst.

Each of these impression materials, handled properly and according to direction of the manufacturer enable the dentist to reproduce his abutment preparations and their relationship to one another and the rest of the dental arch in the poured cast (die) - whereby the fixed bridge can be constructed completely outside the mouth, be finished and ready for insertion at the patient's next visit.

Gingival Retraction- -

- (a) Mechanical and Chemical
- (b) Slow mechanical
- (c) Surgical - periodontal lancet or electro-cautery.

Materials used --

- (1) Alum
- (2) Cotton wrapping thread - kite cord
- (3) Adrenalin chloride - of varying % - 1%, 2%, 8%
- (4) Dental Floss
- (5) Proprietaries e.g. Gingipak, Gingicord.
- (6) Aluminum shell crowns
- (7) Soft temporary stopping
- (8) Fibrous pack
- (9) Electro-cautery equipment for removal of excess tissue.

Materials etc. used for achieving a wax pattern for attachment in a Direct Technique.

- (1) Carving wax - blue, green, black, purple - of varying degrees of hardness.
- (2) Sticky wax
- (3) Carving instruments - vary with operator, matrix bands and retainers.
- (4) Sprues - hollow and of varying gauges 8 - 18.
- (5) Sprue holder - metal or rubber (preferred)
- (6) Asbestos - casting ring and investment material e.g. Cristobalite, Beauty Cast etc.
- (7) Debubblizer to reduce surface tension
- (8) Gold - the carat of which varies e.g. 14K. 16K. 18K. There are trade names which help determine the type to use. The type of preparation determines the degrees of hardness of gold to be used.

(Jelenko)

e.g.

- (a) One surface occlusals - use Type A, soft e.g. Special Inlay
(certified A. D. A.)
- (b) Two or three surface inlays - use Type B medium hard
e.g. Modulary
(certified A. D. A.)
- (c) Anterior 3/4 veneers, Carmichaels
inlays, full crowns - use Type C hard
e.g. Durocast,
Firmilay
(Certified A. D. A.)

Other Type C hard golds - Alboro Inlay
Bridge White
Carmilay

With the J. M. Ney Co.

The Type A - soft

1. is Ney Oro A. A.
2. The Type B - medium is Ney Oro A 1
3. The Type C - hard is Ney Oro B2.

INVESTING TECHNIQUES

- (a) Standard - This is the straight water-powder mix. Water at 70°F. Water and powder ratios vary with manufacturer. It is most important that the manufacturer's instructions are followed explicitly.
- (b) Vacuum investing - can be used with many of the new investments. It helps eliminate air bubbles and gives much better control in expansion of investment. Mix and invest in vacuum followed by immersion in water at 100°F for 20 - 30 minutes or until set, then into low heat furnace.

- (c) Standard mix but followed by immersion BUT NOT submerging of ring in water at 100°F until set. The use of masking tape at top of ring is recommended here to prevent water seepage into investment.

THE BUILDING OF DIES

Copper band - impression allows reproduction of natural prepared tooth in amalgam or diestone material such as Duroc, Diolite or Velmix. The copper band impression is boxed with Scotch tape, wrapped about and extended 1/2" beyond gingival end. Since additional support is necessary if silver amalgam is to be used, to prevent distortion when the alloy is packed the whole unit is immersed in Plaster of Paris. The compound impression may be copper plated later to give a hard workable surface on which the wax pattern may be carved.

When die stone is used for the pouring of the die, the mix must be stiff and NO air bubbles should be incorporated after the vibration pouring. Once set in about 30 minutes, separation is accomplished by softening the compound in warm water or over a Bunsen flame until it becomes pliable. AVOID over-heating as the molten compound sticks and is messy and hard to remove.

Silver amalgam dies must set at least 6 hours, (preferably 24 hours). Before separation cut away plaster index and proceed to remove as with stone die.

Finish both by tapering root form to convenient shape for holding and use later in transfer impression.

Always lubricate dies before waxing patterns to facilitate easy removal - micro film.

STEPS IN CONSTRUCTION OF A FIXED BRIDGE

- (1) Impression of prepared teeth - to produce dies that are exact duplicates of the natural teeth. This is accomplished using 2 techniques.
 - (a) copper band
 - (b) tray methodwith both techniques availability and readiness of instruments and materials is of prime importance
 - (c) occasionally a combination of the two methods is used.
- (2) Building of Dies - already dealt with
- (3) Articulator mounting - usually done by lab
- (4) Waxing Patterns of Retainers - ditto
- (5) Assembling - when using the copper band technique (and sometimes the tray method) the finished attachments are fitted and adjusted to the abutment teeth in the mouth. A full arch impression (with the retainer in place) is taken using one of the many gypsums available. e.g. (Kerr's #2 snow white Plaster of Paris, quick setting) or even a rubber base material. The retainers are seated in the impression, secured with sticky wax and poured

in stone or soldering investment depending on the method of choice. This step is preparatory to carving of the gold portion of the pontic (backing) with subsequent soldering of these to the retainers. The mould and type of facing or aesthetic portion of pontic is often finally selected at this stage. There are two general types of facings used.

- i. e. (a) pin type - pin facing and pin pontic
(b) slot type - flat back and truspontic

- (6) Selection of Shade done by means of shade guide, with patient present and natural light.
- (7) Selection of Mould - (anterior) - by means of mould guide - artificial teeth are tried in mouth for size and shape. This may be accomplished in the laboratory using the casts only (both study models and final casts).
- (8) Fitting of backings, facings and wax carving preparatory to casting pontic - carried on by technician or operator
- (9) Soldering of unit - lab procedure
- (10) Polished fixed bridge - ready for try-in prior to cementation

CEMENTATION OF FIXED BRIDGE

Many a fine bridge has been lost at this stage. The success of this final placement depends a great deal on the background knowledge, experience and ability of the dental assistant re: all dental cements. The exact mixing techniques involved will be covered in detail by another separate 2 lectures.

TYPES OF CEMENTING MEDIA USED WITH FIXED BRIDGES

- (1) Zinc phosphate cements - e. g. S. S. W. Zinc Cement improved, Caulk's or Fleck - shades - for all cementing operations.
- (2) Copper phosphate cements for crown and attachments - e. g. S. S. W. Red Copper, Caulk's Red Copper or Fleck's Red Copper.
- (3) Silicate-type Cements for crowns, inlays, etc. especially ceramic restorations - e. g. S. S. W. Krytex, Dicem and Terralux
- (4) (Sedative anodyne) Zinc oxide type used most often as temporary measure - non-permanent cementation.

e. g.	(1) Zinc-oxide - eugenol	These are all soluble in oral fluids
	(2) Temrex (non-soluble in mouth)	
	(3) Cavitec Dycan	1 exception
and	(4) Many other cements usually mixed in thinner consistency than normal.	
- (5) Plastic - non soluble in mouth, non-germicidal (a disadvantage) extremely adherent to properly prepared tooth substance - e. g. Caulk's Grip cement. Available in five shades. Very useful in recementing inlays etc. which have come out due to poor internal retention. Bonfil (a new restorative acrylic) claims to have germicidal properties and may prove useful in single unit cementation.

OTHER SERVICES

(1) Removal of facings from old bridges out of the mouth.

(a) Porcelain

(i) RAPID: - place whole unit in pickling solution (acid) in enamel dish, cover and boil 5-10 minutes to remove residual cement. Place in solution of bicarbonate of soda. Repeat until facings loosen.

(ii) OVERNIGHT: - place in pickling solution let stay till A. M. Remove water wash and push off facings.

(b) Acrylic Facings (processed trupontics)

if it is not essential that they be saved and bridge is to be disassembled and rebuilt - can be burnt off.

(2) Cleaning of Fixed Bridges before recementing - the assistant can remove the residual cement from the attachments etc. as operator does likewise on the abutment teeth. Using her own discretion she may use any old spoon excavator, stiff brush, acid and any other technique at her disposal.

PORCELAIN JACKET CROWNS

are similar to full crowns in preparation and the impression method followed may be either

(a) Cu band compound - wax bite, Plaster of Paris or

(b) Rubber - base

There are now available

(i) Plating techniques AND

(ii) A new stone or die material which allows the lab to complete this ceramic restoration using this method to advantage

(c) Reversible hydrocolloid is NOT recommended however.

Once the die (amalgam or stone new type) has been obtained the first step is to adapt a stiff platinum matrix to it. Next porcelain is built on the die it is removed and then fired in the ceramic oven as a BISCUIT bake. This is repeated building up the exact mould shape, and shade, and establishing accurate gingival marginal fit about the shoulder. Occasionally biscuit bakes are tried in with the patient to check shape, occlusion, etc. The final firing to place a smooth glasslike surface on the porcelain jacket crown is known as the GLAZE bake.

After the platinum matrix is removed from the inside of the crown it is ready for cementation. Most porcelain jackets are now vacuum-fired for greater strength and resistance to fracture. Careful handling prevents accidental fracturing.

Acrylic Jacket Crowns are similar to porcelain jackets but will resist fracture due to physical properties of bonded plastics. This obvious advantage does not however outweigh the many disadvantages incorporated in acrylic jackets - e. g. shade changing, expansion and contraction with abrupt thermal changes and resultant seepage under crown etc. But as an aesthetic if but temporary restoration, the acrylic jacket definitely services a purpose in dentistry.

Gold-Acrylic Veneer Crowns these are full gold cast crowns with the labial and/or buccal surface cut out, removed and replaced with tooth appearing acrylic - e. g. Huelon. They are used in the majority of fixed bridges using full coverage of the abutment teeth but are also used as a single unit when the occlusion, the length of remaining crown and other governing factors deem it desirable for more strength.

(A) MICRO-BOND: (B) GOLD-POR JACKET CROWNS

These crowns consist of a special metal (of high melting range) (A) platinum alloy or (B) gold alloy for the inner core with a (high fusing) porcelain fired on and thereby bonded to it.

This is one of the latest developments in aesthetic metal jacket crowns and is rapidly gaining in favour among those of the profession favouring full coverage because of its available strength and durability and good cosmetics.

SUMMARY

A brief resume of crown and bridgework directly concerning the dental assistant or dental nurse has been presented in an endeavour to outline and acquaint you with the many basic responsibilities and duties you will assume in this rapidly expanding field of oral rehabilitation. Those pertinent to your office should previously have been very clearly outlined by your dentist.

We have tried to acquaint you with the various techniques as are most often found in the dental office. Regardless of whether the selected method to carry out the work be the ideal as outlined or not depends solely on the operator's choice and the particular case as it enters the picture will help govern his selection. You will find many variations with each and every practitioner and for this reason knowing how is only part of the picture. The most important conquest you as a dental assistant can make is to understand the reason why? For with this knowledge not only does the HOW follow suit but you the dental assistant will gain as much in satisfaction from your part of the crown and bridge procedure as your dentist will when he views his final result.

There is something new to be learned every day and if you take up this challenge in time you will see new skills develop and increase in number day by day and with them a growing sense of deep pride and satisfaction in your work and in your profession.

This lecture is supplemented by selected slides covering (a) technique in the laboratory - as well as (b) slides of actual cases carried through to final insertion.

GLOSSARY OF TERMS

Abutment	Tooth to which fixed bridge is attached.
Attachment	Cast metal retainer, part of fixed bridge which is cemented to abutment tooth - it may be partial veneer 3/4 crown, full crown, full crown with veneer facing and occasionally an inlay.
Pontic	The tooth replacement, false, dummy - may be all metal (gold or hygienic), metal and porcelain or metal and acrylic.
Facing	porcelain or acrylic portion of pontic, the veneer, may be Steele's interchangeable flat-back, truspontic, Porcelain Biting Edge, pin-facing or pin-pontic. These are cemented to metal form of pontic.
Hygienic or Sanitary Bridge	posterior bridge, usually on lower arch where the pontic does not rest directly on residual ridge but has sufficient clearance to permit good and proper oral hygiene.
Solder Joint	lower fusing gold solder which joins the gold of the attachment with the gold of the pontic.
Cantilever Bridge	pontic fixed to one attachment only. Free-end bridge.
Stress-Breaker Bridge	with one of the connectors NON-rigid, a "key-way" or dovetail seat into which a "key" or "lug" fits snugly.
Tissue retraction	movement of the gingival tissue circumferentially to open up the gingival crevice to secure sharp marginal outlines in impression taking. This is accomplished by mechanical, chemical-mechanical and surgical means.
Temporary Crown	(1) in posterior may be aluminum or clear plastic filled with a sedative cement e. g. zinc oxide and eugenol, Temrex, fibrous pack, Cavitec etc. (2) in anterior-temporary acrylic splint, acrylic crowns. Is aesthetic and cemented as posteriors.
Retainer	part of fixed bridge which unites abutment tooth with suspended part of bridge. May be inlay, partial veneer crown or complete crown.
Connector	unites retainer with pontic, may be rigid, as a solder joint or NON-rigid as in tapered key or stress-breaker type.

Transfer Coping

may be acrylic or cast gold. They are made or waxed up on dies poured from copper band impressions usually. Once they are placed on the natural abutments, a full arch impression in rubber-base material or Plaster of Paris is taken over them - they lock in the impression material and the abutments are then related exactly one to the other in every plane on the final poured cast.

TYPES OF BRIDGES: may be classified as to

- (a) Position
 - (i) anterior - 6 front teeth
 - (ii) posterior - back teeth, bicuspid and molars
 - or
 - (iii) combination of the two
- (b) Manner of construction
 - (i) Fixed at both ends
 - (ii) Broken-stress type
 - (iii) Cantilever
- (c) As to length of span involved e. g. long-span or short span.

INTRODUCTION

Prosthodontics is that branch of dental art and science pertaining to the restoration and maintenance of oral function by replacement of missing teeth and structures by artificial devices which we will be referring to in this lecture will be complete dentures, which replace all the teeth in an arch, and removable partial dentures, which replace the missing teeth when there has only been a partial loss of teeth. (slides to illustrate).

PSYCHOLOGY OF DENTURE PATIENTS

Full denture patients are often a psychological problem. At the initial appointment a record should be made of the patient's attitude. Classify the patient as either co-operative, apprehensive or indifferent. His attitude has a definite bearing on the final outcome of the treatment. The better adjusted the patient the more promise to a satisfactory denture service. Less than ideal provides the basis for less satisfactory results.

A co-operative patient is truly desirous of having full dentures made to improve appearance, mastication and general health.

Apprehensive patients are those who do not want others to know they need dentures. They are afraid of waering them, lack confidence in the dentist and in general are not sure that they want treatment. A typical patient of this type is an elderly woman who desires to have dentures and wishes all the wrinkles erased from her face. The overdemanding type who wants the impossible. The assistant is very valuable to her employer in such cases. Her reassurance and calm assistant to the patient, and, her admiration of the results of the dentures, will do much to ease the patient's mind and further reflect a favorable opinion of the dentist.

The indifferent patient is one who is not concerned whether he wears dentures or not. Many times such patients are urged by their children to have teeth replaced. Some of these patients have managed to get along for years without dentures and are not convinced that they are required. Such patients are difficult to please and may not wear the dentures when they are completed.

One type of denture often made for patients is the immediate insertion denture. In this particular procedure, the patient retains six anterior or front teeth and in the final appointment these remaining teeth are extracted and a complete denture inserted immediately (slides to illustrate). The dental assistant may be of tremendous value by her interest and assistance to the patient having this service done. Problems or questions concerning the loss of their last teeth often arise in an individual's mind. Some people associate the loss of teeth with the loss of youth and virility and accordingly believe that old age is

approaching. Many individuals express great concern in this attitude toward age. The cheerful assistant will prove invaluable in the management of these patients. Through encouragement and favorable expressions she can inspire confidence in the patient which may mean the difference between success and failure of the denture service.

MATERIALS AND ITEMS USED IN FULL DENTURE CONSTRUCTION

Consideration will be given to the materials and items commonly employed in the construction of complete dentures. While time does not permit an exhaustive analysis and evaluation of the materials and items referred to or their manipulation, the objective is to identify general procedure. Each assistant may increase her knowledge and skill in accordance with her own initiative, her interest and the policy of the office in which she is employed. You have no doubt had some instruction in a previous lecture in the handling and manipulation of some of the materials which I will be referring to.

IMPRESSION TRAYS

Most dentists will have a selection of trays that vary in type and number, depending upon his particular technique of taking impressions. These trays are usually of soft metal and can be modified by bending and trimming so that a complete selection of these stock trays will fit all types of mouths. (show selection of trays).

If trays are trimmed by cutting they should be made smooth and free from sharp edges that might cut or irritate the patient's mouth during the insertion or trial insertion. It is the assistant's job to see that the trays are clean, smooth and sterilized before being presented to the dentist for impression procedures.

IMPRESSION COMPOUND

This is probably one of the commonest materials used in complete denture techniques. This material has a shellac base and is thermoplastic, that is, it becomes soft upon heating and hardens when cooled. It is softened by heating in water from 110 - 140°F. depending upon the manufacturer's instructions, and will harden at about 99°F, permitting the operator to obtain an impression of the ridge areas of the mouth with a material that is not too hot for the tissues to stand and at the same time hardens at mouth temperatures.

This material is available in several forms and colours. The colour indicates the degree of heat at which the material will melt. Grey compound requires the least heat and then in order of increasing requirement of heat for melting are green, red and black.

These compounds are heated prior to taking the impression in a pan of water at the desired temperature or by a thermostatically controlled heater which will maintain the water at the correct temperature. If an ordinary pan is used on a hot plate or burner a piece of cloth should be placed in the bottom to

prevent the material from sticking to the pan.

A compound impression is generally a preliminary type of impression. A cast is poured from it and an acrylic or quick curing plastic tray is constructed on this cast. This tray is a custom made tray to fit a particular mouth and contours to the ridge more closely than any of the stock metal trays. (instructor will demonstrate how these trays are made) Using this custom made acrylic tray various materials are then used to complete the final impression.

The borders of this tray are muscle moulded with a low fusing type of compound that is available in stick form. This compound stick is softened over a flame and applied to the tray borders in sections. It is tempered in warm water after applying to the border of the tray and inserted in the mouth to obtain a seal of the desired depth and thickness. To complete this type of impression a corrective liner is used. These corrective liner materials are creamy in consistency and harden in the mouth by a chemical reaction, to duplicate all the detail of the denture bearing area.

MATERIALS USED FOR CORRECTIVE LINERS

Plastogum

This material is a modified plaster of Paris which contains natural gums and accelerators. It is mixed with water to a creamy consistency and applied to the impression side of the tray in a uniform thickness. It sets in 2-3 minutes in the mouth and duplicates very accurately the soft and hard areas of the mouth. (instructor will show technique demonstration boards on the application of this material)

Metallic Oxide Pastes

Commonly called zinc oxide and eugenol pastes and are available from the suppliers under various trade names. A unit of this material consists of two tubes. One tube contains a base material and the other a catalyst. A specific length of each of these materials is expelled on a mixing pad and spatulated together to form a creamy mix which is applied to the tray in a similar fashion to Plastogum. It sets also by a chemical reaction in 2 - 4 minutes.

Rubber Base Materials

This is one of the newer materials used for taking impressions. It is also packaged in two tube units, one a base material and the other a catalyst. Specified lengths are expelled on a mixing pad, spatulated and spread uniformly in the tray like the metallic oxide pastes. Upon setting it maintains a rubbery consistency which is dimensionally more stable and for a longer period of time than some of the other materials used in taking impressions. Care should be exercised in the mixing of all these materials to insure an accurate impression.

When using metallic oxide pastes the patient's lips and areas about the mouth should be covered with a thin film of petroleum jelly as these materials stick to the dry skin surfaces and can be very difficult to remove.

SOME OTHER MATERIALS USED IN COMPLETE DENTURE PROCEDURE

Wax

Many different kinds of waxes are used in denture construction. Baseplate wax is the most common and is used in the construction of occlusion rims used for obtaining bite registrations and also used in waxing up a trial denture before it is processed in the final stage. Other waxes are yellow beeswax, stick wax and tooth coloured waxes all used in various procedures in complete and partial denture construction. Very soft low fusing wax is used extensively in taking impressions of difficult or special cases. (demonstration of the uses of these various materials)

ARTIFICIAL TEETH

Tooth selection for dentures can be done simply or for better results can be a very painstaking procedure. There are several companies which manufacture teeth and each has its own way of identifying moulds and shades. A mould guide and shade guide can be obtained from these manufacturers of artificial teeth and it is by their use that the dentist correctly chooses the shade, shape and size of tooth which harmonizes best with the patient's features and complexion.

Various measurements are made of the patient's face and teeth are selected which are proportionate to these measurements. The outline features are also taken into consideration, and teeth which harmonize with the outline form of the face are selected. A pleasing shade or colour of teeth must be chosen and these teeth are then tried in the patient's mouth on a temporary base to finally arrive at a result that is satisfactory to both the patient and the dentist. When a satisfactory shade and mould have been selected, these teeth will then be ordered from the supply house or through the laboratory which the dentist patronizes.

HOW TO ORDER ARTIFICIAL TEETH

Anterior teeth by common agreement include centrals, laterals and cuspids, six teeth in all. The order then for anterior teeth for a single denture is written (1 x 6) . Two sets of anteriors in the same mould and shade would be written (2 x 6). Upper and lower anterior sets should be written separately to avoid confusion, that is (1 x 6 upper); (1 x 6 lower). Posterior teeth are ordered in sets of eight, since there are generally eight posterior teeth on a single complete denture. The order for posterior teeth would be written (1 x 8 upper) or (1 x 8 lower). Combinations of these sets are sometimes written as 1 x 14 upper which is a 1 x 6 anterior set plus a 1 x 8 posterior set. Often (1 x 28) is used and this is an order for all the teeth, both anteriors and

posteriors, for a complete upper and lower denture. In all instances be sure that the shade and mould for both anterior and posterior teeth accompany the order.

Now to inter-relate a few of these things we've discussed and also to mention some new materials and equipment let us follow through briefly an acceptable procedure for a complete upper and lower denture.

First Appointment

In this appointment the patient presents his problem if any, his desire and wishes. A thorough history of the patient is recorded. This record should also include such data as reason for presentation, past experience with dentures and so on. A start can also be made at this time to classify the patient's attitude.

A complete visual, digital and radiographic examination can also be done at this first appointment. The ease or difficulty of the case should be discussed and an estimate of fees should not be overlooked as this point alone can be a very troublesome one if the facts are not presented to the patient.

If time permits, preliminary impressions can be taken at this appointment. The assistant should have impression compound ready in a water bath, and also a selection of clean sterilized trays for the operator's use. Many minutes of valuable time would be lost if these things were left until after the patient arrived.

After the dentist has selected the proper tray, the assistant with some training will be able to assist the dentist in softening and manipulating the compound and loading the tray for his use.

The patient will then be dismissed and between now and his next appointment these preliminary compound impressions will be poured in plaster or stone and suitable quick-curing acrylic trays constructed. These trays will then be used at the next appointment to obtain final impressions of the upper and lower arches.

With some instruction and a little practice a dental assistant can become quite adept at pouring these impressions and fabricating an acrylic tray. (instructor will demonstrate how this procedure is carried out)

Second Appointment

For this appointment the assistant should have in readiness these items and materials: acrylic impression trays, low fusing stick compound, a small torch or bunsen burner, tempering bath of water at 130°F., a sharp knife, the material of choice for the corrective liner and petroleum jelly if the corrective liner is to be one of the metallic oxide pastes.

The acrylic trays will be trimmed and fitted by the dentist. He will then apply the low fusing stick compound to its borders until he is satisfied that the impression has been extended correctly. The impression is now ready for the corrective liner. Since the metallic oxide pastes are most commonly used for this purpose their manipulation will be discussed briefly.

All dry skin surfaces that may come into contact with the material should be lubricated lightly. Petroleum jelly is good for this purpose. The assistant should lubricate her hands, especially around her finger nails, and also the immediate area around the patient's mouth before the dentist takes this final impression.

Expel the correct amounts of this material on a mixing pad. Allow about one minute to spatulate the material thoroughly and fifteen seconds to carefully load the tray so that all surfaces are uniformly covered. The tray is then handed to the dentist who will insert it in the mouth and complete the impression. The final impressions having been completed, a careful examination should be made of the patient, by the assistant, to be sure that all impression material and lubricant are removed from the patient's face. (slides to illustrate)

These impressions will be boxed and poured in stone to procure a hard detailed master cast upon which the dentures will be fabricated.

Occlusion rims must be constructed on these casts in order to obtain jaw relation records at the next appointment. These occlusion rims are often constructed by a commercial laboratory but can easily be done by a competent assistant. (Instructor will show how this is done by using demonstration boards and slides)

Third Appointment

For this appointment the assistant should have available for use these items and materials; the occlusion rims on the casts, a few sheets of baseplate wax, a broad spatula for reducing the wax rims, a bunsen burner, a sharp knife, smaller wax spatulas of choice, a Fox plane, face-bow, shade guides and a mould guide or other instruments that the dentist may use to measure the patient's face for tooth selection.

The dentist will contour and reduce the wax occlusion rims until he arrives at an acceptable jaw separation and contour that will be suitable for the patient. The occlusion rims are notched and secured in these various relations by means of wax or plaster so that the same relations can be transferred to an articulator for the setting up of the teeth. Some dentists will use a more complicated but more scientific method of obtaining these registrations and that is by the use of a Gothic arch tracing. This instrument records graphically the movements of the jaw. (slides to illustrate) A face-bow will be used to transfer the relationship of the upper jaw to the head of the condyle for purposes of mounting the casts correctly on the articulator.

The tooth selection and shade are generally made at this appointment. The dental assistant frequently helps in the selection of the shade since her colour perception may be better than that of the dentist. By transferring certain measurements from the patient to the occlusion rims, the shape and size of teeth for this patient can be tentatively selected.

The casts with wax registrations, face-bow transfer and all pertinent information and instructions, written on a laboratory prescription form and signed by the dentists are sent to a commercial laboratory where try-in dentures are set-up for the patient's next appointment.

To reduce the bulk of sending wax registrations and other instruments to the laboratory the assistant can very easily mount these casts on an articulator and have the dentist make the necessary articulator settings. (Instructor will show how this is done)

Fourth Appointment

At this appointment the wax dentures are tried in the patient's mouth. This preliminary try-in allows the dentist and patient to examine the appearance and bite and make any alterations or adjustments deemed necessary. The assistant should have the following items ready for use as required: a bunsen burner, wax spatula, mirror for the patient to examine the try-in dentures, and grinding wheels for shaping or adjusting the teeth if necessary. A dental assistant may be invaluable at this appointment in reassuring the patient that the teeth look acceptable and have a pleasing effect. She may also make suggestions that will improve the esthetics. It is also good policy to have the patient bring along a friend or relative to pass comment on the dentures as this is the only time any changes can be made relative to their appearance.

The dentist himself must be satisfied that his registrations are correct, and that, providing the patient co-operates the dentures will function properly. When all concerned are satisfied with the results so far obtained, the patient will be dismissed and the dentures returned to the laboratory for processing and finishing.

Fifth Appointment

Delivery of the dentures to the patient:

Patients generally look forward to this day with anticipation; however, they are often very exacting at this appointment and may even be somewhat critical of various aspects of the completed dentures. The dentist and dental assistant must be careful in making comments, as a few ill chosen words may mean the difference between success and failure. Reassurance that the dentures look pleasing is in order. Do not have the patient repeat things he may say or he will think he cannot talk properly with his dentures. The patient must be aware

that there is a learning period to be hurdled before he will derive complete satisfaction in appearance and usefulness from his new dentures. Explain to the patient that every denture wearer has to go through this stage, some more quickly than others, due to anatomical differences and mental attitude. It is also a helpful service to give the patient a pamphlet on how to handle their new dentures, what to expect from them for the first week or so and general points of information regarding adjustments that they can read after leaving the office. Arrange an appointment to see the patient in 3 to 4 days time, to do any necessary adjustments. The dentures will settle slightly, or shift due to occlusion, causing sore spots. Only the dentist can make adjustments to relieve the possible discomfort.

Sixth Appointment

At this appointment the assistant should have available a selection of wheels and stones for the dentist to make adjustments to the denture base material, and also to correct any faulty occlusion that may be causing the denture to tip or become unseated during mastication. After the dentist has made these adjustments, the dental assistant should take the dentures to the laboratory and polish these areas that have been ground. This is done on a laboratory lathe using cotton buffs and pumice followed by tripoli to produce a smooth polished surface to the denture that will not irritate the patient's mouth.
(slides)

This essentially completes the procedures done at the chair and in the laboratory in the fabrication of complete dentures.

There are various procedures which have been briefly outlined and explained, that are the responsibility of the dental assistant. It is also necessary that the assistant know the dental laboratory methods and the time required between various procedures in order that appointments be made intelligently for the patient. There is no set formula but it is a pattern that the assistant will have to learn from the laboratory in the locality.

DENTURE REPAIRS

Although most repairs are done by the laboratory one simple type of repairs that can be done by the dental assistant in the office is the replacement of a fractured tooth on a denture. (instructor will demonstrate the procedure)

PARTIAL DENTURE PROSTHESIS

The appointments required and responsibilities of the dental assistant are very similar to those of complete denture procedures.

There are however different materials used to obtain the desired type of impression. Two of the more common materials used today for obtaining these impressions are agar hydrocolloid and alginate hydrocolloid. We will discuss the differences and the handling and manipulation of these materials.

ALGINATE HYDROCOLLOID

This material is most often used to obtain preliminary impressions. Perforated trays are necessary in order to retain or hold the material in the tray when the impression is being removed from the mouth. Thirty minutes or so before the appointment, a selection of these trays should be placed in a cold sterilizing solution. The materials and items the assistant should have ready for this appointment are; several packages or measures of alginate powder, a water measure, some soft wax for modifying the perforated trays, a clean rubber mixing bowl, mixing spatula, and a supply of water (77°F.)

Mixing this alginate material demands care and skill. The manufacturer's directions on the package must be followed carefully to obtain the best possible results.

A specified amount of water (77°F.) is first placed in a clean dry rubber bowl and to it is added the full measure of powder. The mixing time is critical and should be done by the clock. (slides to illustrate) The material is then loaded into the tray rapidly and passed to the dentist for insertion in the mouth.

This material sets in a short period of time by a chemical reaction and must be poured up immediately to avoid dehydration and subsequent change or distortion. Just prior to pouring the impression, it should be placed in a two percent solution of potassium sulphate for five minutes. This is a hardening solution and produces a cast of greater accuracy with a harder and more detailed surface. During the time the impression is setting in the mouth the dental assistant can clean the rubber bowl and spatula and be in readiness for a second or even third impression if necessary.

AGAR HYDROCOLLOID

This material requires preliminary attention before it can be used. It is supplied by the manufacturer in plastic tubes which have to be boiled to render the material soft and of uniform consistency. While the material is still in its plastic container it is then reduced in temperature by tempering in water at 130°F. or less. This allows the material to be reduced to its proper working consistency and also a temperature which can be tolerated by the mouth tissues.

Since the material sets by cooling instead of by a chemical reaction, special water-jacketed trays are used. Rubber tubing is attached to the tray and to the water tap on the unit so that water circulates from the tap through the tray and out through another piece of tubing to the cuspidor. The tray is maintained in the mouth for about six minutes before it is removed. This material should also be poured in stone as soon as possible to prevent

distortion. Do not place the impression in water as the material will take up water and swell. If for any reason the impression cannot be poured immediately, wrap it in a damp towel to prevent dehydration.

Subsequent appointments at the chair are similar in many ways to complete denture work. The patient will be recalled for bite registrations, try-in of a cast metal framework with teeth waxed in position, and final insertion of the completed partial denture. (slides and demonstration boards to illustrate)

Care must be exercised in pouring these alginate and agar hydrocolloid impressions. A good thick mix of stone should be used to procure a hard well condensed cast. Excess water should be removed from the impression and the stone vibrated into the impression beginning at one heel of the impression and allowing the stone to flow from one tooth impression to the next in a cautious manner. After the tooth areas are filled, the bulk of stone should be applied to form a base one-quarter to one-half inch in thickness. (slides and demonstration)

There is a number of methods by which a satisfactory partial denture can be constructed. To be of paramount value, the assistant must learn the dentist's preferences, be familiar with the sequence of steps and act as a liaison between the office, patient and commercial laboratory.

References:

Brauer John Charles The Dental Assistant New York
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GLOSSARY OF TERMS

Acrylic	One of a group of synthetic thermoplastic substances. Used in making denture prostheses and temporary artificial eyes. Lucite and Plexiglas are commercial forms.
Anteriors	Situated in front of or in the forward part of.
Articulate	To bring the teeth in one arch into proper position with the teeth in another arch.
Articulator	An instrument for holding casts of the jaws or teeth in proper relationship during various steps of artificial denture construction. It may be adjusted so as to duplicate the mandibular movements of the patient.
Artificial Stone	A specially calcined gypsum derivative similar to plaster of Paris with a physical difference in that the grains are non porous, thereby resulting in a product which is stronger than plaster of Paris.
Baseplate	A temporary form to represent the base of a denture which is used for making jaw relation records and for the arrangement of teeth.
Buccal	Pertaining to, or adjacent to, the cheek. The surface of the posterior teeth adjacent to the cheeks, buccal vestibule, or buccal cavity.
Cast	An object formed or poured in a matrix or impression, as of metal, plaster, etc. A positive reproduction of the form of the tissues of the upper or lower jaw, which is made in an impression, and over which denture bases or other dental restorations may be fabricated.
Condyle	The rounded articular surface at the articular end of a bone.
Denture	An artificial substitute for missing natural teeth and adjacent tissues.
Esthetics	The branch of philosophy dealing with beauty or the beautiful. Of or pertaining to the beautiful as distinguished from the merely pleasing. Referring to a product (denture) which has a definite appreciative quality in terms of its material organization of form and colour.

GLOSSARY OF TERMS

(continued)

Face-Bow	A caliper-like device which is used to record the relationship of the maxillae to the temporomandibular joint.
Flask	A sectional metal case in which a sectional mould is made of artificial stone or plaster of Paris for the purpose of compressing and processing dentures or other resinous restorations.
Mandible	The lower jawbone.
Mastication	The process of chewing food for swallowing and digestion.
Occlusal Surface	A surface of a posterior tooth or occlusion rim which is intended to make contact with an opposing occlusal surface.
Plaster of Paris	Calcined calcium sulfate in the form of a fine white powder. About one half of the water of crystallization has been driven off, and when water is added it solidifies to a porous mass that is used extensively in dentistry and in surgery.
Prosthesis	The replacement of an absent part of the human body by an artificial one.
Shellac Bases	Certain resinous materials adapted to maxillary or mandibular casts to form base plates.

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- Brauer John Charles. The Dental Assistant New York
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- The Academy of Denture Prosthesis. Glossary of Prosthodontic Terms.
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QUESTIONS AND ANSWERS

1. What care must be exercised by the assistant in the use of metallic oxide pastes in obtaining final impressions?
 - (1) Be sure the patient is well covered so that this paste does not get on the patient's clothing.
 - (2) The dental assistant should lubricate her hands to prevent the paste from sticking to dry skin surfaces.
 - (3) The patient's mouth and area immediately about the mouth should be lightly lubricated to prevent the material from sticking.
2. List eight materials and items that the dental assistant should have available for the dentist at the bite registration appointment.
 - (1) Occlusion Rims.
 - (2) A few sheets of baseplate wax.
 - (3) Bunsen Burner.
 - (4) Sharp Knife.
 - (5) Fox Plane.
 - (6) Face-Bow.
 - (7) Wax Spatula.
 - (8) Shade Guide.
 - (9) Mould Guide.
 - (10) Instruments of choice for transferring measurements of the patient's face.
 - (11) Gothic arch tracer, if used.
3. How should an agar hydrocolloid impression be poured in artificial stone?

The impression must be poured immediately. Shake out the excess water and saliva. Use a relatively stiff mix of stone. Use a vibrator and begin at one heel of the impression, vibrating the stone into the impression and allowing it to flow from one tooth impression to the next in a cautious manner. After the tooth areas are filled the bulk of stone should be applied to form a base one-quarter to one-half inch in thickness.
4. Define:
 - (1) Articulator
 - (2) Baseplate
 - (3) Mastication.

Articulator

An instrument for holding casts of the jaws or teeth in proper relationship during various steps of artificial denture construction. It may be adjusted so as to duplicate the mandibular movements of the patient.

QUESTIONS AND ANSWERS (Cont'd)

Baseplate

A temporary form to represent the base of a denture which is used for making jaw relation records and for the arrangement of teeth.

Mastication

The process of chewing food for swallowing and digestion.

INTRODUCTION

The outline of your course in Dental Assisting stipulates that this chapter in Dental Public Health is to deal with the responsibility of the dental profession to the community as its patient. At this point in your studies you should indeed consider yourselves as members of the dental profession and more specifically the auxiliary or ancillary personnel. As such you have a definite responsibility to the community. The concept of the "community as a patient" may be a new one to you as compared to that of a specific patient in the dental office or chair who is to be treated. We shall elaborate on this and shall make some comparisons during our discussion.

In addition we wish to study the relationship between the private dental practice and a public health program and indicate the significance of this relationship with specific reference to the area, community or municipality in which these function.

The field of dental public health is a division of the broad field of public health and is presently providing many opportunities for employment in so far as dental assistants are concerned. It is vital that you understand these new concepts and some of the duties and activities of dental assistants in the field of dental public health.

HISTORICAL BACKGROUND

Antiquity to Middle Ages

Dentistry in its most primitive form dates back to antiquity. In primitive days there was no actual division between the dental and medical arts. There were no schools or faculties of dentistry or medicine. In its earliest beginning the methods of treating human ills, dental and physical, were acquired through chance, instinct and necessity. As we would expect many false ideas prevailed among the primitive peoples about the causes of maladies and subsequently the prescribed treatment was likewise mysterious and odd.

Of the ancient peoples the rise of civilization was first observed among the Egyptians who were the inhabitants of the valley bordering the river Nile in Africa. Documents called papyri discovered there indicate that they were written around 1550 B. C. and still others around 3500 B. C. In these documents are references to dental and gingival diseases and remedies for a toothache. One remedy was a crude poultice for drawing pus from an infected area. Even to-day we use a poultice for the same purpose. Egyptian mummies have been found with gold and wooden fillings as well as artificial teeth. It would appear that dentistry was practised at this early period of civilization for the purpose of preserving teeth.

The Bible and the Talmud contain, in the main, our Hebrew literature. In either we do not find any mention of dental treatment. The books of Moses contain a great many hygienic and preventive measures but none of them refers directly to the teeth or the oral cavity. We may justly infer that the Hebrews in general at this time had sound and healthy teeth and dental infections were rare. In the book of Solomon, in fact, reference is made to a broken-down tooth as symbolic of weakness and conversely we are justified to presume that sound healthy teeth symbolized strength and pride.

In Chinese history at a comparable period in their civilization we have descriptions of nine variations of a toothache and seven types of diseases of the gums. Treatment methods also were described among which is puncturing the gum tissue to relieve pain resulting from an abscess related to a tooth

The ancient Greeks displayed amazing ability in the art of medicine and dentistry during the early period of their civilization. Hippocrates, considered the father of modern medicine and who was taught by his own father about the year 500 B. C. , was the inventor of the first forcep for the extraction of teeth. He makes mention of the first teeth of a child being formed before birth. He recognized that these teeth were shed at about 7 years of age and those succeeding remained throughout adult life. He appeared to understand and relate food and drink to the condition of teeth. He made important observations with respect to the effect of a toothache on the rest of the body. These indeed were profound observations and are of notable significance in the science of dentistry as we understand it to-day.

The Middle Ages

There was very little evidence of progress in the field of dentistry during the middle ages. There was still no division between medicine and dentistry. As late as the 14th century in England an English doctor by the name of John Gaddesden prescribed crude remedies for dental ills such as fat of green frogs for the purpose of loosening and pulling teeth, rubbing the brains of a rabbit on the gums to help the eruption of teeth and "make them grow". About this same period another noted surgeon by the name of Guy de Chauliac was the first to make references to "Dentators" and their instruments. This was a group of men who practised dentistry exclusively and as separate from medicine. This we might consider to be the beginning of the concept of dentistry as a separate profession.

Early Modern Times - 16th - 18th Centuries

During this period notable strides were evident in the science and art of dentistry. Although most significant dental discoveries were made by surgeons and medical practitioners, dentistry was becoming more and more a separate profession. The first title of dental surgeon was conferred in 1622 A. D. on a man called Gillies, in France.

Walter Ryff, a German doctor wrote the first book on dentistry. He recognized that there was a relationship between teeth and eyes and maintained that because of this relationship neither could be healthy without the other. This of course we do not uphold to-day but we are aware of the fact that abscesses of the upper cuspid teeth may affect the eye.

Ambrose Pare, a French surgeon, describes a case of setting a broken jaw and replacing 3 teeth which were knocked out. He was the first writer to describe transplanting of teeth from one mouth to another although he himself never practised it. He also described palatal obturators and he corrected speech when the palate was destroyed by accident or disease.

Wilhelm Fabry, a famous surgeon of Berne, Switzerland, writes about extracting teeth from a woman to relieve severe head pain. He noted that she had a very bad dental condition and after extracting four teeth her pain disappeared. We do acknowledge the fact that teeth may be the cause of facial neuralgia in the region of the 5th cranial nerve.

Pierre Fauchard, a French doctor who was also an extensive writer, expounded a doctrine of dentistry, both theoretical and practical and thereby gave a scientific basis on which dentistry could proceed as a profession. He strongly recommended that dental schools be built for the express purpose of teaching the art of dentistry. In his publications he is the first to describe and use a toothbrush and cleaning teeth both inside and outside, up and down "in the morning". He was keenly aware of the importance of good oral hygiene. He practiced orthodontics and recognized the hazards of crooked teeth.

Dentistry in America up to 1840

Dental history in America up to this period is very meagre. There is mention of a Mr. Dinley, a barber surgeon and tooth puller, soon after the landing of the Pilgrim Fathers in 1650. In a New York Journal dated 1735 there appears an advertisement which reads, "teeth drawn by Jimmy Mills". There were no dental schools during the early period. Anyone who could win the confidence of the public could establish himself as a practising dentist.

Joseph LeMair, a surgeon, came to America with the French army during this period. He studied dentistry in Paris and undertook to teach dentistry in America. This can be considered to be the beginning of teaching dentistry in America although no recognized official dental school as yet existed. In 1825 Dr. Horace Hayden delivered lectures in Dentistry at the University of Maryland. In 1839 he was responsible for founding the Baltimore College of Dental Surgeons, the first and oldest Dental College in America of which he was also the dean.

Late 19th and early 20th Centuries in America

This period is characterised by a rapid development of dentistry as a specialty or a profession. A Faculty of Dentistry as distinct from a Faculty of Medicine emerged in the universities and men began to devote their full time activities to the teaching and development of the science of dentistry. New developments in the improvement of techniques for treatment of dental diseases emerged rapidly. Dr. Maynard developed the Maynard dental drill. Dr. Riggs discovered a treatment for periodontal disease. Dr. Horace Wells discovered a general anaesthetic. Rapid improvements were made in silver and gold restorative materials, the rubber dam and such like. The microscope was developed as an aid in detection of oral micro-organisms, the X-ray tube for dental X-rays and dental diagnosis. Vital dental publications began to circulate such as Dr. G. V. Black's work on dental nomenclature, Dr. Wm. Hunter and his essay on Oral Sepsis, Dr. Winter and Oral Surgery and Dr. Halstead and the discovery of cocaine as a local anaesthetic.

Most Recent Dental Developments

During the past 10 to 15 years there emerged the high speed dental drill, hypnosis was introduced as an aid in dental clinical treatment and within the past year the audiocassette or the scientific method of using psychological sound to produce an analgesic effect on the patient.

From this historical record we can trace a very significant trend. This trend or tendency is that of improved clinical treatment methods and is even more dramatically illustrated when we subdivide this historical record into four eras as follows:

1. Empirical Health Era

From antiquity to about 1850 A.D. the emphasis in dentistry as it was known and practised was on the diagnosis and treatment of obvious symptoms. For example an ulcer on the gum resulting from an abscessed carious tooth would be treated by a poultice to reduce the area of inflammation and swelling. A fever would be treated by blood letting. The whole emphasis was to observe the symptoms and then treat them accordingly.

2. Basic Science Era - 1850 - 1900 A.D.

With the development of the basic sciences particularly chemistry, bacteriology, and physiology, a profound change in attitude and philosophy of health took place. This change was primarily one from diagnosis and treatment of the symptoms to the diagnosis and treatment of the disease proper. For example it was during this period that a relationship was

established by Dr. Miller, who was a dentist, between dental caries and micro-organisms in the mouth. The metabolism of these organisms on the carbohydrates and refined sugars produced an acid which destroyed the hard tooth substance. Many efforts were made to introduce drugs and related substances into tooth pastes and mouth washes for the express purpose of eliminating or destroying oral bacteria and cleansing of the teeth and oral cavity in this way and thereby prevent tooth decay.

Whereas in medicine this method of treatment progressed very favourably and proved extremely effective in the field of communicable diseases, dentistry was not successful to decrease the ever-increasing rate of dental disease among the population at large.

3. Clinical Science Era - 1900 - 1950 A. D.

At the turn of the century another change in the health sciences took place, from diagnosing and treating the specific disease to that of diagnosing and treating the total individual. This in no way precludes that the knowledge and application of the clinical sciences in this method of treatment was incorrect. On the contrary this was a logical forward development in the method of treating physical ills. It was Dr. Wm. Hunter, an English surgeon, who brought to the attention of his colleagues in medicine and dentistry the fact that there existed a close association between the teeth, gums and the rest of the body. He believed that whereas a chronic tooth abscess may do little damage in the immediate area of infection, the infectious organisms may enter the blood stream, lodge in other vital tissues of the body and thereby become a menace to the general health of the patient. The concept of focal infection in relation to systemic diseases is to-day firmly established. A patient with a history of bacterial endocarditis presenting himself for extraction must first be treated systemically to insure against serious complications. A medical history of a patient is of utmost importance to a dental practitioner and more so to a dental specialist prior to commencement of any treatment.

4. Public Health Science Era - 1950

This is the era in which we live to-day. It provides a community centered form of health service. It involves a change from the diagnosis and treatment of the individual to the diagnosis and treatment of the community at large as a patient. This concept of a health service is becoming rapidly accepted throughout the world.

The two preceding wars with the necessary measures of preparedness have brought about a deep conviction on the part of health and government authorities that dental health and general health were intimately related. They also recognized the value of dental health as an individual, a community and a national asset. With the introduction of control and preventive dental health measures they began to realize that prevention and control of dental

and oral diseases by the various preventive measures is better and cheaper than the treatment of dental and oral diseases after they have progressed to the final stages. This was the basis that was needed to initiate dental public health programs as we have them to-day.

2. DEFINITION AND SCOPE OF DENTAL PUBLIC HEALTH

The meaning of public health up to a comparatively recent period was somewhat obscure. This can be attributed in part to the fact that it was a new concept and a rapidly changing one. The broad general principle or basis which underlies public health is that every member of the community is entitled to protection with respect to their health. Public health can be defined as, "a scientific diagnosis and treatment of all the health needs of a community as a patient". Another definition of public health and probably a more elucidating one is as follows, "the science and art of preventing disease, prolonging life and promoting physical health and efficiency through organized community efforts". Public health concerns itself with the total health of a group of individuals whether this group is contained within a community, a municipality, or a similar territorial division. In public health we recognize the community or municipality as the patient of our greatest and immediate concern.

Health should be a matter of personal concern and in the main it is particularly after one falls ill. To maintain an efficient degree of health certain health principles and health measures must be respected on an individual basis. In our congested and complex urban way of life these same health principles and measures must be respected by the community or a municipality. On a community level we have such health measures as proper sanitation, safeguarding of communal water supplies and the control of communicable diseases. Such health measures on behalf of the individual of a community are most effectively and economically instituted and controlled on a local government level by a public health department. The health of the public and the individual to-day are the result of a complex interaction and co-ordination of many professions and skills. All of these are necessary to arrive at a proper diagnosis and plan of treatment for the community. Some of the professions involved in public health are as follows, medicine, engineering, sanitation, health education, nursing and the most recent health profession to be included in the field of public health is dentistry. Thus within the framework of a public health department we will have along with the various divisions such as the division of communicable diseases, division of sanitary engineering, division of nursing and with others a division of dental public health.

Dental public health can be defined as follows, "a science and art of preventing and controlling dental diseases and promoting dental health through organized community effort". Such a division within the framework of a public health department functions in co-operation with the medical,

nursing, engineering and other health services of the health department along with the local members of the dental society, board of education, service clubs, voluntary agencies and such like. A dental public health service can only be successful through teamwork where each service organization and health division maintains a wholesome regard for one another and the role that each must assume with the welfare of the community in mind.

In comparing the definitions of public health and dental public health there is a common denominator expressed by the word "preventing" which is significant and important. In the matter of personal or individual health, prevention on the part of the individual encompasses those activities which will prevent disease, promote individual and family health and thereby provide protection for these. The person responsible for offering aid and guidance in the exercise of the necessary preventive measures in this case is the private physician. Thus we can say that preventive medicine represents the discharge of those responsibilities by the family physician on behalf of the individual or family for the prevention of disease and promotion of health within the family as a unit. As we indicated earlier, there are in our complex urban society certain preventive health measures such as provision of a safe water supply, control of communicable diseases and others, which are most effectively instituted and controlled on a local or municipal government level by a public health department. Thus in the latter respect we can say as is indicated by the definition that public health represents the discharging of community responsibilities for the prevention of disease and promotion of health with the community as a unit.

In the first instance above the family or the individual is the unit for consideration, and in the second instance the community is the unit for consideration. It is vital to understand however that prevention of disease and promotion of health is a joint responsibility of the individual, the family and the community. These are very intimately related. Any activity that is undertaken for the prevention of disease and promotion of health on the part of a community will invariably benefit the individual or the family. We must also recognize and emphasize that the difference lies not so much in the activities themselves but the assignment of responsibilities for carrying out the essential interrelated activities of prevention of diseases and promotion of health by any means.

Turning our attention now to the field of dental public health we have a parallel situation. From antiquity to the latter half of the 19th century dentists concerned themselves with the diagnosis and treatment of the gross or local manifestations of dental diseases. Their main responsibility was to relieve a toothache with a dental restoration or an extraction and this marked the limits of dentistry's contribution to individual dental health. Dentistry at this stage did not have the knowledge regarding preventive measures

against dental diseases upon which to base a dental public health program. Progress in the mechanical achievements of dentistry in the last century, has been most remarkable and this has brought to North American dentistry world-wide renown. With the advent of the microscope, the discovery of oral micro-organisms, the X-ray tube, the enunciation of the focal infection theory, there followed during the last 40 to 50 years an understanding and recognition of the relationship between dental health and the general health of the individual. This relationship as a result of extensive research was rapidly substantiated and clarified during the past 25 years and began to influence markedly both the private practice of dentistry and medicine. The last war particularly revealed to government authorities the serious incidence and nature of dental diseases. Prevention and control of dental diseases was introduced on a mass basis and then followed dental public health programs in communities and municipalities.

To-day dental schools are gradually introducing into their curricula the study of the methods of preventing and controlling dental diseases and promoting oral and dental health. The bulk of the dental practitioner's service is still restorative in nature and is a treatment service but there is a growing enthusiasm for preventive dental services by the general dental practitioner. Just as preventive medicine represents the discharge of those responsibilities by the family physician on behalf of the individual or the family for the prevention of disease and promotion of general health so we have preventive dentistry which represents the discharge of those responsibilities by a family dentist on oral health. We may thus define prevention of oral and dental diseases and controlling the progress of existing dental and oral diseases. Preventive dentistry as preventive medicine can be carried out by a general dental practitioner or by a municipality or community through the division of dental public health. When a general dental practitioner practises or institutes preventive dental health measures he is practising preventive dentistry but when a community undertakes to promote and institute these measures it is practising dental public health. Thus we can say that dental public health is preventive dentistry applied to a community or a municipality. Preventive dentistry whether practised by a general dental practitioner or a community has a vital public health implication.

3. PURPOSE OF DENTAL PUBLIC HEALTH

By definition dental public health has to do with preventing and controlling dental diseases. I wish first to tabulate those dental and oral diseases which are of greatest concern in the field of dental public health. Then I would like to briefly indicate the incidence and prevalence of these diseases among our own population. Finally I wish to explain the specific dental preventive and control measures that are available in a dental public health program. In conjunction with the latter we also have a responsibility in the matter of teaching dental health education.

Among the group of dental diseases of greatest concern to us, dental caries, or dental decay is by far the most prevalent. This disease may begin in the teeth of 2 year old children i. e. soon after these first or baby teeth have fully erupted. These teeth are also called deciduous or primary teeth. There is an accepted theory to-day as to the cause of tooth decay. Bacteria or organisms in the mouth act on any fermentable carbohydrate or sugar taken as food and quickly convert the sugar into an acid. Then the acid so formed dissolves out the minerals from the enamel and dentine of the hard tooth substance producing a carious lesion. Dental caries differs from all other diseases in two ways, first, if left untreated it never heals or cures by itself and secondly dental decay never becomes dormant but is progressive to a terminal point of loss of the tooth and possible systemic complications.

Periodontal Diseases are the diseases of the soft gum tissue and jaw bone which serve as supporting structures for the teeth themselves. It is a degenerative disease which increases in rate with age and after 35 years of age more teeth are lost as a result of periodontal disease than from dental decay.

Gingivitis is a disease of the gums or gingivae, the soft tissue adjoining the teeth. It is usually demonstrated by an inflammatory reaction of varying severity and has a number of causes.

Malocclusion is an abnormal positioning or relationship between the upper and lower teeth. There are many different variations in this dental disease. Typical examples of these is a situation where the lower jaw extends beyond the upper jaw like that of a bulldog or one side of the jaw may be a different shape than the other side or one or two teeth may be twisted or tilted out of their regular alignment. Apart from the relatively simple types of malocclusion, it requires the services of an orthodontist who is a dental specialist in the art of correcting malocclusion.

Intimately related to the above dental conditions are other conditions or habits which in themselves are not diseases but are frequently associated with dental diseases and more frequently are predisposing causes.

Poor Oral Hygiene is a condition of the mouth indicated by green or brown stain on the teeth, materia alba or a soft white matter coating the teeth or tartar which is a hard substance of a mineral composition which is deposited on the teeth. The tartar originates from saliva and is prominently found behind the lower anterior teeth or on the cheek sides of the upper molars.

Improper Toothbrushing . For many years very little significance was put on the method and frequency of toothbrushing or its purpose. We recognize to-day that it is not sufficient to tell a child to brush their teeth and leave the full responsibility with the child. There must be adult supervision of the brushing technique at least once a day for each child until the child reaches an age when it can assume this responsibility seriously. The proper method

of brushing should be taught to both parents and children as well as the frequency and the reasons for doing so. Improper brushing, no brushing or inadequate brushing of teeth is detrimental to teeth, gums and the general oral health of the individual.

Premature Loss of First, Baby or Deciduous Teeth. For many years very little attention or importance was given to the child's first teeth. Because these are followed by a second dentition and one also known as permanent dentition, parents regarded the baby teeth of no consequence. This is a very erroneous concept. Dentists who graduate from a recognized Dental College are trained to treat and respect these baby or deciduous teeth for the normal span of service. Premature loss of these teeth is the greatest single cause of crooked or irregular permanent teeth which is very costly to restore and also is a very lengthy procedure.

Lack of Dietary Control. It is most unfortunate that to date dental research has not discovered a nutritive food or mineral element that is acceptable to be used in our daily diet for the prevention of dental decay. We do have a fluorine element when added to water in a ratio of 1 part of fluorine to 1 million parts of water and which when ingested from birth or during early childhood, will reduce the incidence of dental decay by as much as 65%. However this has not as yet been accepted by many government health authorities or the public at large. However we do know that certain sweet sticky foods such as candies, sugared pastries and such like, when present in our diet and taken in the mouth especially between meals and at bedtime without brushing of teeth, contribute to a marked increase and incidence of dental decay. An acid is produced by the bacterial action on the sugar which dissolves out the mineral salts from the hard tooth structure and the tooth disintegrates i. e. dental decay is formed. It has been discovered that the decay process could be stopped or inhibited by reducing or eliminating the sweet sticky foods and candies from the diet. Although this relationship is not demonstrated in every instance it is sufficiently consistent to show that there is a relationship between caries activity and sugar in our diet and especially in caries-susceptible patients.

It has been found that dental caries doesnot occur when daily food intake contains no sugar. When individuals who are highly susceptible to dental caries are placed on such a diet the organisms responsible for production of acid cannot live. Dental caries then does not occur. Following the reduction of these organisms by the use of such a restricted diet, patients can gradually increase their intake of carbohydrate without the return of the previously high count of oral organisms. The control of sugar and carbohydrate intake especially in children is vital to their dental health.

With respect to the incidence and occurrence of some of the dental diseases and conditions previously outlined, there are several which are of grave concern

to public health dentists and private dental practitioners as well. Because the training of a dentist at a university has up to a very recent date, emphasized dental treatment it is to be expected that preventive services and dental health education would not be a part of the dental practice procedure. This concept is changing, however, as is the teaching and training of a prospective dental practitioner. The preventive dental service and dental health education are taught more and more and will be. The dental profession to-day is keenly aware of the fact that it has failed by treatment alone to meet the dental needs of the population.

While it is true that in Canada we have a higher material standard of living than in many countries, particularly in respect to supermarkets, automobiles, automatic washers and dryers, drip dry suits and such like, the dental health of the population in Canada is appalling. It is estimated that over 95% of the entire population is affected with dental decay. In a recent conference on Canadian children held at St. Adele, Quebec, for the purpose of identifying and assessing present day needs of Canadian children, the following report was presented. In the pre-school group, 2 to 4 years of age, 5 out of 10 or 50% already have dental decay. In the elementary school group 5 to 15 years of age almost 10 children out of 10 or nearly 100% already have dental decay. Dental decay left untreated invariably results in premature loss of the tooth. Again the pre-school group 2 to 4 years of age 1 out of 10 or 10% have lost one tooth. In the elementary school group 5 to 15 years of age, 4 out of 10 children or 40% have lost a tooth prematurely. Many parents and adults still do not believe that premature loss of a deciduous or permanent tooth is too serious. They accept it very casually at the time. However it is the beginning of more serious dental problems to follow. We know that premature loss of teeth in a child is one of the greatest causes of crooked or irregular permanent teeth. In the preschool group 2 to 4 years of age, 3 out of 10 children or 30% already have crooked or irregular teeth. In the elementary school group, 5 to 15 years of age, 1 out of every 10 or 10% have severe irregularity of teeth and 7 out of 10 or 70% have a less serious irregularity of teeth.

Children and adults require proper instruction as to how to brush their teeth, when and why and also as to the type of toothbrush they should have. This seems trite and incidental even to mention. However no brushing or improper brushing of teeth is the greatest cause of poor oral hygiene. In the pre-school group, 2 to 4 years of age, 2 out of 10 or 20% have poor oral hygiene. In the pre-school group, 2 to 4 years of age, 2 out of 10 or 20% have poor oral hygiene. In the elementary school group 5 to 15 years of age, 5 out of 10 or 50% have poor oral hygiene. Poor oral hygiene together with irregular teeth at this age is a very serious situation. We speak of periodontal disease and tend to relate it always to adults or old people. There is no doubt that it has its beginning at the level of school children with such poor oral health. It has been estimated that in the pre-school age group 2 to 4 years of age, 1 out of every 10 children has already early

periodontal disease and in the elementary school group 5 to 15 years of age, 2 out of 10 or 20% have the early symptoms of periodontal disease. These children lose a large number of teeth prematurely from dental decay but by the time they reach the age of 30 to 35 years although the dental decay rate subsides, they continue to lose seemingly sound teeth because of periodontal disease. Leading authorities in U.S.A. have stated that dental disease in children is occurring 6 times faster than it is successfully treated. The rising incidence of tooth decay among Canadian children alone is such that it is physically and financially impossible to cope with it. In areas where it appears there is a reasonable number of dentists by comparison, less than one fifth of all decayed teeth which require dental care are treated. This leaves no time for treating periodontal diseases or irregular teeth. In other areas less favoured in respect to the number of practising dentists, less than one tenth of all dental diseases are treated. It is an obvious observation that some other action, remedy or measure, other than dental treatment alone is absolutely imperative.

Preventive dentistry as practised by the private dental practitioner in conjunction with the dental treatment and public health preventive dentistry as practised by a public health dentist in conjunction with a dental public health program, provide the immediate measures that are necessary and can affect, reasonably quickly, the dental health of our population. The preventive dental health measures are not complex, they are not expensive, relatively speaking as compared to dental treatment but they do require promotion through a dental health education programme.

Fluoridation of Communal Water Supply

Fluorine is a chemical element which is found in many natural rocks. It combines with other chemical elements such as sodium to form a fluoride which is a salt and is soluble in water. Most natural water supplies and various foods contain varying amounts of the fluorine element. Under normal living conditions we consume a very small quantity of this element in our daily diet. However drinking water is the main source of our fluorine element intake. Large groups of people in many parts of the world such as Argentina, Canada, China, India and U.S.A. have for centuries been drinking water containing this fluoride salt. In 1931 it was first discovered that there was a significant relation between the amount of fluorine in drinking water and the incidence of dental decay among the population drinking this water. Dental research since that time has shown that a proper amount of fluoride taken into our body while the teeth are forming will reduce dental decay by about 65% and will give lasting benefits throughout life. Experiments conducted in various parts of the world have led to the conclusion that 1 part of fluoride to 1 million parts of water is the best proportion for maximum safe benefits to the teeth of individuals. In this proportion it is tasteless, odorless and completely safe.

Some areas and communities have the right amount of fluoride in the drinking water naturally and others have an inadequate amount as compared to the above ratio. To-day it is possible to adjust the fluoride concentration to the optimal level in any water supply. Medical, dental, pharmaceutical and other health professions highly endorse fluoridation of communal water supply for the express purpose of reducing the incidence of dental decay, especially among school children. On the other hand opponents to this public health measure have risen up and are denouncing it as a potential threat to life itself and its implementation as a violation of human rights. Most unfortunate of all legislation has been passed in this province prohibiting fluoridation of communal water supplies in municipalities desiring it but allowing it to continue where it was already instituted prior to the legislation.

Fluoridation, nonetheless, deserves a prominent place in a dental public health program with respect to promoting it and together with the dental practitioners and dental assistants we must educate and motivate the public with respect to their desire for and an understanding of this most important preventive dental health measure.

Topical Fluoride Application

We realize, of course, that there is a large proportion of our population that live in areas not serviced by a municipal water supply. In this case fluoridation is not practical. However there is another proven method of getting some benefits of the fluoride element in reducing the incidence of dental decay among the school children. This method is known as the Topical Application of Fluoride Solution directly to all the outer surfaces of healthy young teeth. There are 2 types of fluoride solutions in use to-day:

- (i) - Sodium Fluoride 2% solution. It is applied on all healthy teeth at ages 3, 7, 10 and 13 years. Four consecutive treatments one week apart are usually required.
- (ii) - Stannous Fluoride 8% solution. This also is applied on all healthy teeth and on all outer surfaces. Commencing at 3 years of age or a little later it is applied once a year in case of a child not susceptible to dental decay or more frequently in case of a child who is susceptible to dental decay.

Many such studies reveal that with this method of fluoride application, dental decay can be reduced by 35% to 50% in children. Many dental public health programs have incorporated in their preventive dental services the topical fluoride application for all eligible children. It is also a service which the dental practitioner is prepared to render and frequently does so to his private patients. The dental assistant will not be expected to perform this service by herself but will be assisting closely in its application and follow up.

Important Baby Teeth

A child is born without any visible teeth but deep within its jaws there are already 20 deciduous teeth and the first permanent molars in the process of formation. At 6 months the 1st deciduous tooth erupts and in a definite orderly sequence they erupt at regular intervals until at 2 1/2 to 3 years of age the child has a full complement of baby teeth, 20 in all. These teeth are also called temporary teeth and unfortunately so as it tends to give parents the erroneous impression that they require no attention as they will ultimately be lost and the permanent teeth will follow. These baby teeth are to function in the main, until the child reaches the age of 11 years and sometimes a little longer. It is about this time that the deciduous molars are lost and are replaced by the permanent bicuspid. It is folly to neglect them. They are most important for the following reasons.

1. For proper chewing of food.
2. For the child's normal appearance.
3. For the child's normal development of the face.
4. For the normal eruption and alignment of the permanent teeth.
5. For the normal development of speech and at a time when speech habits are permanently formed.

Early Dental Care

The first dental appointment for a child to a private dental office should be around 2 1/2 to 3 years of age regardless whether there are any visible dental cavities or defects. This provides an opportunity for the child to make an adjustment to a dental office and procedure without having to undergo necessary dental treatment simultaneously. It may be necessary to bring the child to a dental office 2 or 3 different occasions before any dental treatment can be rendered at this age. Children at 2 years of age are known to have developed dental decay. American dental statistics have reported that 50% of all 2 year old American children have at least one carious tooth. In all probabilities Canadian statistics would show a similar situation.

Left untreated deciduous teeth will continue to decay in the same way that permanent teeth decay. Premature loss of deciduous molars in particular is a serious thing. Should the first deciduous molar be lost before the child is 8 years of age or the 2nd deciduous molar be lost before the child is 10 years of age, there is definitely a grave possibility that the original space created by the extraction of these deciduous molars prematurely will gradually diminish and the space required for the permanent teeth to follow will not be adequate. A crooked and irregular alignment of permanent teeth is inevitable. These children are potential orthodontic

problems. Reports from the Burlington Orthodontic Research Centre Study indicate that in Ontario whose total population is around 5 million we have close to one million cases of malocclusion. There is no possible hope of these children getting orthodontic treatment either in a private dental office, an orthodontist's office or from a dental public health program. We do not have the personnel or the facilities to do the work and the cost whether from private or public funds would be prohibitive.

The best we can do to-day is to stress and emphasize at the lowest pre-school and kindergarten age level to parents and guardians that we have effective preventive measures against malocclusion and the most important one is early and regular dental care for baby teeth. Following this care these teeth should have a stannous or sodium fluoride topical application applied periodically as recommended by the family dentist or as is provided by a dental public health program. These two preventive dental health measures can be instituted early in the life of the child to prevent loss of the important deciduous teeth.

Space Maintainer Service

When baby teeth must be extracted prematurely and in many instances this is the case to-day because there has not been proper care of these teeth from the time they erupted, we fortunately have a preventive measure against drifting of teeth and closure of the space so created. An appliance known as a space maintainer can be inserted into the child's mouth to hold the space open that was created by the extraction of a baby molar prematurely and thereby it guides the permanent tooth into proper position and alignment. This service can be rendered most satisfactorily in a private dental office and in certain dental public health programs there is provision made for this appliance to be inserted for all school children who qualify. The space maintainer is retained in place until the permanent tooth has erupted through the jaw bone and is assuming a normal position just below the gum tissue with the tip of the cusp partly showing perhaps. It is then removed to allow the permanent tooth to meet the antagonist of the opposing arch.

Oral Hygiene

Oral hygiene has to do with the maintenance of the health of the hard and soft tissues of the mouth. The two most common disorders that are detrimental to teeth and gums in the mouth are dental decay and periodontal disease which includes unhealthy gum tissue or gingivitis. The simple yet effective test of oral hygiene i. e. whether it is good or bad is the individual smile. If there was no other reason for good oral hygiene that the making of a beautiful healthy smile, it is worthwhile. A smile can only be beautiful when the teeth are healthy and beautiful and the combination

invariably depicts a healthy physical body as well. Preventive oral hygiene measures are all those measures which contribute to healthy teeth and gums. All preventive dental health measures mentioned thus far could be incorporated in this discussion. However there is one basic measure that is so simple and so frequently overlooked, namely toothbrushing, which is immediately and intimately related to good oral hygiene. If the toothbrushing exercise is performed correctly and consistently it is very effective in maintaining proper oral health and is effective in preventing dental disease as well. Toothbrushing should be done within 10 minutes after each meal and each snack. Brushing before retiring at night is most important and this should be done regardless of the food or drink that is consumed. Toothbrushing should commence with children as soon as 10 to 12 teeth have erupted. The brushing of course at this time will not be effective but it will help to associate the toothbrushing exercise as one to be performed immediately following a meal. At this age and indeed up to the teenage level toothbrushing should be supervised by an adult, parent or guardian at least once a day. Toothbrushing to be effective must be done properly. Improper brushing may do more harm than good.

Toothbrushing

There are several variations from a basic technique of brushing teeth but a typical procedure is as follows: The teeth of the upper and lower jaws are brushed independently. The occlusal or biting surfaces of the upper left posterior teeth are first brushed with a backward and forward motion of the brush. The brush is brought over to the right upper posterior teeth and the same motion is engaged on the occlusal or biting surfaces of these teeth. Then the brush is brought over to the outside or buccal surfaces of the upper right posterior teeth and with the ends of the bristles held at the junction of the gum tissue and teeth, the outside or buccal surfaces of these posterior teeth are brushed with a downward stroke and a slightly vibratory motion. This exercise is brought slowly forward over the outside or labial surfaces of all the front or anterior teeth and then continued over to the left side and to include all the buccal or outside surfaces of the left posterior teeth. The brush is then brought over from the outside surfaces of the left posterior teeth to the inside or lingual surfaces of the left posterior teeth i. e. on the palate side. Again with the edge of the brush held at the junction of the gum tissue and teeth, the inside surfaces of all the upper left posterior teeth are brushed with a downward stroke and a slightly vibratory motion. This exercise is brought slowly forward over to the inside or lingual surfaces of all the front or anterior teeth and then continued on to the right side to include all the inside or lingual surfaces of all the right posterior teeth.

The same procedures are followed when brushing the lower teeth except that the brush stroke in every instance is in the upward direction instead of a downward direction. It is essential to rinse well with water during the brushing exercise.

The method of brushing teeth must be demonstrated to parents and teachers who in turn instruct and supervise the brushing of the children's teeth in the home and school. The type of toothpaste or toothpowder used is less significant than the proper technique of toothbrushing. A very recent toothpaste containing stannous fluoride shows promise of reducing the rate of dental decay and can be an effective preventive dental health measure as further research will reveal. The type of toothbrush used is also important and patients should consult the family dentist or school dentist in this regard.

Diet Control

Dental research has revealed that dental decay cannot occur without specific organisms or bacteria in the presence of a suitable food such as sugars for them. The bacteria that cause tooth decay grow most profusely in an environment of refined sugars. We can thus prevent or control dental decay by eliminating or reducing concentrated sugars from our diet and particularly in between meals and at bedtime. An appetite for sweet foods and candies is acquired by children very early in life. They do not require it but without proper supervision and control they will develop a liking for these foods that are so destructive to teeth. Candies, jams, pastries and such like are particularly harmful to teeth and should be excluded from school lunches especially when teeth are not brushed at school.

Nutrition and Dental Health

The essential foods that are necessary for building sound and healthy bodies are also necessary in building sound and healthy teeth. In a community health program where Child Health Centres exist, the dental public health program can function effectively regarding instruction on nutrition and diet to expectant mothers. The future infant's teeth are partly formed long before birth. For the general health of the mother and baby, nutrition plays a vital role. The importance of proteins, vitamins C, D and A is the same during the development of the baby as following the birth of the baby. The mother's optimal health is most important to the future infant during the pre-natal period. Any damage inflicted to the developing infant's teeth is irreversible during this period. Expectant mothers should be urged to follow Canada's Food Rules together with the physician's advice regarding any supplements which might be necessary. Following birth the basic nutritional requirements of the baby remain and must be provided. These influence the general health of the baby throughout life and the health of the teeth only up to 13 or 14 years of age.

Dental Health Education

This can be defined as the sum total of all dental experiences and dental health knowledge which one has acquired and which favourably influence one's dental and oral habits, attitudes and practices. Through the process of dental health education individuals are motivated to participate in desirable health habits and practices and are also further influenced to

participate in and support a dental public health program.

One who engages in dental health education is not a specialist. Furthermore dental health education cannot be promoted satisfactorily as an individual project. Because the present dental problem is so complex the person engaged in teaching dental health education must know also the principles as we will outline them, in the operation of a private dental practice or a dental public health program. The dental health education program is orientated within the framework of these principles.

Furthermore dental health education like any health education cannot be handed down from one person to another. It is not a set of procedures to be carried out. It is an active and a continuously changing process of education and development whereby the individual is accepting and rejecting new information, new attitudes, new practices, concerning dental and oral health and appropriates these with a view of improving one's dental and oral health. This is not easy to accomplish on an individual basis and when we endeavor to perform such a task on a mass or community basis, the task becomes much more difficult. In order that we effectively motivate an individual or a community by means of a dental health education program there are three basic concepts we must keep in mind.

(i)

We require authentic information. Claims of authenticity are frequently misleading to the public. Authentic dental health information must pass through the cycle of research, trial, acceptance by the profession and finally acceptance and utilization by the public. There are at present reliable official agencies to endorse such information. These agencies in part are as follows: The Canadian Dental Association, American Dental Association, Canadian Public Health Association as well as the respective provincial health associations. There is little justification for utilizing unofficial data or information and which is not supported by reliable dental or public health authorities.

(ii)

The public must be systematically informed and motivated. Much of our dental health literature places specific emphasis on isolated dental health facts such as, eat the right foods, keep the teeth clean, visit the dentist regularly and such like. When presented to the public in a haphazard manner such statements even though true, frequently become confusing and seemingly contradictory in the minds of the public. They are not advised intelligently that all these statements are true and that they supplement one another. There is an order of priority to such statements. We must have some intelligent order or sequence to the teaching of dental health facts. An intelligent and effective dental health education program will put the emphasis where it belongs and then bring in supplementary data and information to substantiate the significant statements. In this way we broaden

the field of knowledge of the citizen regarding dental health progressively and as he is prepared to receive it. In the final analysis our presentation of dental health education is only effective when the public is motivated to take some action that will improve the dental and oral health of the community.

However we must understand that the individual experiences certain mental phases during our dental health teaching which brings about a favourable change in his attitude towards dental health. First we have the sensitisation phase whereby the individuals are made aware of the existence of specific dental diseases which may be affecting them presently or could affect them. The individual mind is thereby made sensitive and receptive to additional information on this particular subject. Then follows the publicity phase whereby more specific details such as the incidence of the dental diseases, the seriousness of such diseases are presented and brought to the attention of the public. We then have the educational phase in which the previous facts are applied to the individual. This phase usually provides a personal contact with the dental health authorities. The individual begins to acquire sufficient dental health knowledge to produce a change in his attitude towards dental and oral health. The final phase is that of motivation. This is not the acquisition of more knowledge but what is done with the knowledge acquired in respect to producing definite and favourable overt action. In order to motivate citizens to put into practical use the dental health education imparted to them, they must be brought to a place where they feel their need for action and have a basic urge to behave in conformity with the teaching. There are often many fears, prejudices, emotions and customs which must be unlearned before new knowledge can be accepted which will motivate them to change their attitude and behaviour towards dental and oral health.

(iii)

We must use proper and most effective methods and media of presenting dental health educational material. It is conceivable to have on hand authentic dental health data and be very active in propagating it. However, if our methods and media are not effective there will be no motivation. Knowledge plays an important role in establishing proper dental health habits but if it does not effect an improvement in the dental health of the population it is merely an academic item. There are several basic fundamentals in selecting and utilizing dental health educational materials, namely, it should be appealing to the interests and needs of the individual such as a desire for an attractive appearance, a desire for a feeling of physical well-being, a need for social and financial security, it should be understandable and meaningful, it should be specific and at some stage of instruction there should be some provision for integrating dental and oral health with the physical health of the individual.

Among the wide range of types of materials, facilities and services available for a dental health education program, we might mention in part, the press, the radio, the T.V., the spoken word, pamphlets, slides, films, film strips, posters and others.

4. METHOD OR PROCEDURE IN DENTAL PUBLIC HEALTH

The main function of dentistry in the past as our quick review of dental history bears out, was that of dental treatment. Very recently we have introduced preventive dental health measures. Closely allied to such measures we have dental health education responsibilities. Then finally as we merely mentioned there is the dental research aspect of dentistry. To-day dentistry as a profession must assume a fourfold responsibility in all the four practices, namely,

- (i) dental treatment services.
- (ii) preventive dental health measures
- (iii) dental health education
- (iv) dental research

When dentistry is incorporated into an official public health department or agency as a division of dental public health, it should concern itself with all four practices of dentistry. However, because there is not always the complete unanimity as to what constitutes dental public health this is not always the case. Other reasons such as a shortage of dental personnel or lack of space or facilities or a lack of funds may limit the practices of the division of dental public health.

There are many dental public health programs which incorporate extensive personal dental treatment services to children very similar to that rendered in a private dental office by a private dental practitioner. Such an office would be equipped similarly to a private office and the dental treatment services are in the main dental fillings, prophylaxes and extractions. Such facilities, however, are located in a school, a municipal health building, a hospital or a public dental clinic. This could be a one-chair dental office or a multiple unit office. The duties and responsibilities of a dental assistant are similar to that in a private dental office. The duties and responsibilities of a dental assistant are similar to that in a private dental office. As dental assistants you have definite duties and responsibilities whether it is a private dental practice or a dental public treatment clinic, which encompass an order and sequence of activities which we call principles of a dental practice. These principles give direction and an order to the practice of dentistry:

(i) Dental Interview and Examination

The patient comes to your office with a problem or request involving dental treatment or advice. As a dental assistant you have definite responsibilities in making the initial contact with the patient. The dentist completes the examination and you assist in charting the personal record card.

- (ii) Diagnosis
The dentist makes his diagnosis on the basis of the examination in preparation for the treatment plan.
- (iii) Then follows the dental treatment plan in preparation for the actual dental treatment. The dental assistant is expected to understand reasonably well the various dental operations and procedures that will be necessary.
- (iv) The actual dental treatment follows in accordance with the preceding plans. The dental assistant plays a major role in so far as she is the chair assistant during the dental operative procedures.
- (v) The arrangement for payment for the dental services follows.
- (vi) Finally the dental assistant is responsible for recalling the patient for re-examination at intervals of 6 months or as is satisfactory to the patient and dentist.

The dental assistant in a private dental office has definite duties and responsibilities in establishing and maintaining a dentist-patient relationship likewise the dental assistant in a dental public health program has definite duties and responsibilities in establishing and maintaining a public health dentist-community relationship in respect to the dental health of the community. The public health dentist performs a dental service for the community in the same way as a private dentist renders a dental service for a private patient. The principles are the same but as the service is somewhat different in type the terminology will be different as would be expected.

Let us compare the order and sequence of activities in which a dental assistant is involved in respect to maintaining a public health dentist-community relationship in a dental public health program and those activities in which a dental assistant is involved in respect to maintaining a dentist-patient relationship in a private dental office:

(i) The Dental Survey

The community first becomes aware of an acute dental problem within its boundary. This may be in respect to the dental health of the school children or some other age group. Dental treatment may not be available due to a shortage of dentists in the community or no dentists are available at all. A community health committee may be studying dental preventive measures. The public health dentist is then asked by the community through a Board of Health or Municipal Council to

explain this service and render some assistance. Just as a private patient presents himself for treatment in a private office so a community presents itself for dental services also.

Just as a dentist examines the dentition and oral cavity or a physician examines the body so the public health dentist conducts an examination of the community. However in dental public health we do not use the term dental examination but rather a dental survey. Nevertheless it is an examination and the methods and purposes of the survey are the same. It is for the purposes of determining the nature and the extent of the dental problem or problems such as dental decay, periodontal diseases, malocclusion or crooked teeth, poor oral hygiene and such like among the children of the population within the community. The role and responsibility of a trained dental assistant is a major one in a survey.

(ii) Analysis of Data

Just as a dentist will analyze and study the examination chart and case history of the patient in a private dental office so the public health dentist analyzes the survey data of a community with respect to the dental condition that prevails to arrive in both instances at a diagnosis. An accurate diagnosis in the case of treating a private patient is extremely important and such is the case in a diagnosis or analysis of a community dental survey. The information collected in this survey is analyzed and studied to determine the special dental characteristics of the community. As we are dealing with a group of people when we involve a community, the forms used for the examination data will be different and the descriptive terms used will be different. For instance when dealing with a private patient we indicate the actual number of carious teeth a patient has but when a large number of people are involved we speak in terms of rates or averages or the number of times this event occurs among the numbers or group involved in a community. We use such terms as percentages, ratios, samples, ranges to convert the raw dental data of our survey or examination into meaningful expressions which properly describe the dental condition of the community.

(iii) Program Planning

On the basis of our analysis of the dental data we propose a dental public health program to the community. In private practice the dentist plans a treatment program for the patient and informs him of it prior to commencement of the actual treatment. A private patient may decide to have all the necessary and recommended dental treatment done or part of them only. Similarly a community through its Council or Board of Health may decide to adopt a comprehensive preventive dental health program together with a dental health education program and a clinical treatment program or any combination of these. This will depend also on the specific dental health problems observed from studying the dental data from the dental survey.

(iv) Program Operation

Following our program planning the actual operation of the program proceeds. In a private office you proceed with dental restorations, bridgework, extractions or a prosthetic appliance for the individual patient. In a dental public health program you may still perform some of this clinical treatment but in the main you institute preventive dental health measures together with a dental health education program. With reference to the high rate of dental decay one of the most important public health preventive measures is the fluoridation of the communal water supplies. If this measure is not in effect it might be the proper time to promote this measure. We could also engage in promoting a topical fluoride application program for all eligible children. We could also give consideration to a space maintainer service for children on a public health level. In the schools we could effectively introduce instructions in the technique of tooth-brushing. Simultaneously with the promotion of preventive dental health measures we must engage in dental health education.

(v) Budgeting

In a private practice on completion of the treatment for a private patient arrangements for payment are made. In a dental public health program there is no fee for service rendered. The patient has been rendered a service for which he pays through the municipal tax. The amount

of this tax charged to dental services is dependent on the estimated cost of the entire dental public health program in the community and this total amount is included in the municipal budget for the current year. Just as in a private practice there is an invoice to submit to the patient so in a dental public health program there is a dental budget to submit to the Board of Health of a municipality.

(vi) Evaluation

In a well organized and efficient private dental practice there is a recall system for the patients on a 6 month basis or some other basis agreeable to the patient and dentist. During the recall observations are made with respect to the existing oral and dental conditions and comparisons are made with the original and preceding observations which have been recorded. Thus the dentist can see whether the oral and dental health of the individual is maintained or is further impaired. In a dental public health program we also have a recall system. The dental data collected in the original survey gives us the dental health condition of the community of the group examined at the commencement of the dental public health program. This is the base line data and thereafter annual community dental surveys will reveal whether our preventive dental health measures and dental health education are effective in improving the dental and oral health of the population group in our community.

Thus we can see how the procedures carried out by the practising dentist and those carried out by the public health dentist are very similar and they can be tabulated as follows:

Procedure in a Private Dental Office

Procedure in a Division of Dental Public Health

- | | |
|--|--|
| 1. Dental Examination of the patient. | Dental Survey of the community. |
| 2. Diagnosis of the dental condition. | Analysis of dental data from the survey. |
| 3. Treatment Planning for the patient. | Dental public health program planning for the community. |
| 4. Dental treatment for the patient. | Program operation for the community. |

5. Payment of fees for dental services.

Budgeting for the dental public health program.

6. Recall of patient

Evaluation of the dental public health program.

Thus we see that there is a similarity and a parallel in respect to the various practices and procedures and principles in both a private dental office and a Division of dental public health. The training that such a course as this in Dental Assisting offers and the experience that you as a dental assistant acquire in a private dental office is an asset to you in dental public health and similarly the experience that you acquire in dental public health is a valuable asset to you in a private dental office.

In the majority of dental schools to-day the dental curriculum includes some teaching in dental public health principles and practices. It is recognized more and more that the practising dentist should know and appreciate the services of a public health dentist. He then is equipped not only to practise dental treatment in his own private office but also to appraise, understand and take greater action in solving community dental health problems. The private dentist also can then supplement and support, more effectively, an organized dental public health program in a community.

On the other hand one of the most important qualifications of a public health dentist is that he have several years of practical and clinical experience in the general field of dentistry whether in a private dental practice or a hospital dental clinic. Following this experience he acquires additional training in the field of dental public health administrative principles, procedures and practices.

By the same token dental assistants employed in a private dental office should understand in part the duties and responsibilities of a dental assistant in a department or division of dental public health and conversely a dental assistant employed in a division of dental public health should understand in part the duties and responsibilities of a dental assistant employed in a private dental practice. Such a mutual understanding contributes to the accomplishment of the objectives of both the public health dentist and a private dental practitioner namely, healthy teeth for all.

Dental Survey and Analysis

Basic to introducing a dental public health program in a community an accurate dental survey and analysis is vital. It is possible to organize a dental survey of the entire population of a community. As dental surveys are most helpful when they are restricted to selected population groups by age, the population of a community should be categorized as follows for specific use of a dental public health program:

Expectant mothers and infants to 3 years.

Pre-school children, 3 to 5 years.

School children 5 to 18 years.

Young adults 18 to 25 years.

Adults 25 to 65 years.

Senior citizens 65 and on.

Very few dental surveys include the entire population in a community as we do not have at the present time, a comprehensive practical dental public health program that is all-inclusive to meet the existing dental needs of all the above categories or age levels of a community population. The preventive dental health measures we presently have are furthermore most effective at the pre-school and school age level. As these population groups can readily be reached through our existing school educational system at the present time, most dental public health programs are directed to reach primarily these two categories. In this respect the available dental public health service, as yet, is not an all-inclusive one.

There has evolved a basic method of surveying and diagnosing the school children population of a community together with the necessary record forms. It would be helpful briefly with the aid of sample record forms to attempt to demonstrate how a dental survey is performed. The dental assistant plays an important role in this procedure. Simultaneously with such a dental survey in a school, immediate dental information is made available with respect to the dental health of each child. This information is immediately conveyed to the teacher and the parent and such information is used to motivate the school children themselves together with parents and guardians to assume their responsibility in the matter of oral and dental health. As a dental assistant you will be assisting either a dental hygienist or a public health dentist in such a dental survey of the school population in the community.

Prior to entrance into a school for the express purpose of this survey, arrangements must be made with the Board of Education or the school authorities. At all times it is important to keep in mind that simultaneously other health services are also involved in some form of health service and hence interruption in the childrens' education program must be kept to a minimum. When such a survey is done in a school, portable dental equipment is used. This includes a folding chair, a portable light, a supply of sterilized hand mirrors and explorers and towels. Desk or table space is required for the dental assistant and a washroom readily available for the washing of hands. The actual dental examination can be done in the classroom or in the school health office.

School class lists are obtained from the principal 's office. On these we have the necessary information regarding each child's name, address, phone number, birth-date, place of birth and the parents' or guardian's name. From this school class list the names only are transposed to a

School Grade Dental Health Report form. As the public health dentist examines the children the data called out is recorded on the appropriate forms by the dental assistant. Under "Treatment Needs" on this form we indicate for each child in the class the dental condition we observe at the time of the examination. This report is filled out in triplicate. The dental treatment needs for each child are noted under the following: untreated dental cavities, space maintainer, irregular teeth and poor oral hygiene.

At the same time we have a Parent or Guardian Notification Form filled out, for each individual child examined.

On this notification form the same observations are noted which were noted on the School Grade Dental Health Report and for each child respectively. The dental data collected thus far is indirectly significant to our dental survey. However it does have a significant value from the point of view of dental health education and motivation on the part of the parent, guardian and the child itself. In many instances receipt of a dental notification by a parent in respect to her child is sufficient motivation for the parent to do something about the dental health of this child and take some action in respect to obtaining a dental appointment with the family dentist. However when there is no family dentist as will be indicated on this form by the parent when she receives it, signs it, and returns it to the school office, then the dental assistant at a later date can follow up such a family and direct them to a dentist in the immediate vicinity. Where a dental public health program encompasses a treatment clinic such a child could be directed to such a clinic for the actual treatment.

The three copies of the School Grade Dental Health Report are distributed as follows: one to the dental office, one to the class teacher and one to the school nurse or the public health nurse who visits the school. In this way there are three persons who know about the dental condition of each respective child namely, the public health nurse or school nurse, the teacher and the public health dentist. Every parent or guardian is likewise informed about her respective children in the matter of dental needs.

From the School Grade Dental Health Report we pick out every 3rd, 4th or 5th child. This ratio depends on the total number of children to be examined and so chosen so that it will give us approximately a sample of no less than 200 children per age group in the entire school population to be surveyed. Such a child then is not only given the cursory dental examination as above but also a detailed dental and oral examination which is recorded on another form, a School Dental Health Record. This record form with the dental data collected on it is most important in so far as our dental survey is concerned. All the items required in the dental survey are arranged in an orderly way and one which is conducive to quick and accurate recording by the dental assistant.

The School Dental Health record form contains the complete identification of the child, complete dental examination with specific notations for both deciduous and permanent teeth. As dental caries is our greatest concern we require specific information in respect to deciduous teeth that are carious, restored or lost prematurely and indicated respectively by the small letters d. e. and f. The sum of these three items, d. e. f. , indicates the total number of deciduous teeth which have decayed, are presently filled and have been prematurely extracted. Similarly for permanent teeth we have specific information in respect to the number of permanent teeth that are presently filled and these are indicated, respectively, by the capital letters of D. M. and F. The sum of these three items, D. M. F. , indicates the total number of permanent teeth which are decayed, are missing and are presently filled.

However this school dental health record has more than dental caries criteria indicated. This is also the form which indicates periodontal and gingival observations and defects and space maintainers needed and in place and so on. For each individual detailed dental examination record there is a wide variety of dental observations to be recorded. Thus we see that during the actual dental examination in a school classroom there are 3 record forms filled out concurrently namely, the School Grade Dental Health Report in triplicate, the School Dental Health Record for a limited number to give us the survey data and the Notification Form for each child. Because the grades in a school are based on the age of each pupil it is relatively easy to obtain a required sample of children for each age group to examine in detail and record the findings on the School Dental Health Record for purposes of a dental survey. The detailed dental data from these individual Health Record Forms is then transposed to a Summary Form. On this form similar data are added and averages or percentages are ascertained relative to the dental condition of the entire school population.

The most common use of a dental survey is to determine the prevalence and incidence of dental caries, crooked teeth, poor oral hygiene, periodontal disease and tooth mortality. From the Summary Form the averages, percentages, rates and other dental data in respect to the oral and dental health of the community or school population are recorded in a collation book which is a permanent record and is used for reference and comparison.

Program planning and operations are based directly on the results disclosed from the dental survey and analysis. Budgeting for a dental public health program is related to the implementation of the recommended preventive dental health measures and the extent of dental health education that is necessary. When similar dental data are collected from year to year within a school population the effectiveness of the dental treatment services of the private dentists and the preventive dental health measures and dental health education program of the public health dentist can be compared and evaluated.

Annual self-analysis and evaluation of the effectiveness of our preventive dental health measures, dental health education, and dental treatment services of the local dental practitioners is necessary. Our knowledge regarding preventive dental health measures and clinical treatment of oral and dental diseases is by no means static. Provision must be made for continual research for new and better methods of prevention and control. Thus the dental public health program should at all times be open for revision and review.

To realize our aims and objectives in dental public health we require considerable time and planning. We need to set objectives and project these five and ten years ahead. A three-year program will provide us with all the base line data and information that is become integrated into the local health department and into community life. We also require at least a five-year program to make concrete observations and comparisons with the base line data. In this way the effectiveness of the dental public health program can be appraised and intelligent revisions be made.

GLOSSARY OF TERMS

Public Health	is the science and art of preventing disease, prolonging life and promoting physical health and efficiency through organized community efforts.
Preventive Dentistry	is the branch of dentistry devoted primarily to the prevention of oral and dental diseases and controlling the progress of existing oral and dental diseases.
Dental Public Health	is the science and art of preventing and controlling dental diseases and promoting dental health through organized community efforts.
Dental Caries	is decay of the teeth.
Periodontal Disease	is the disease of the soft gum tissue and jaw bone which serve as supporting structures for the teeth.
Gingivitis	is a disease or an inflammation of the gum tissue.
Malocclusion	is an abnormal positioning or relationship between the upper and lower teeth.
Orthodontist	is a dental specialist in the art of correcting malocclusion.

Space Maintainer	is an appliance constructed for the express purpose of preventing adjacent and opposing teeth from moving into the space left by the teeth lost prematurely, a method of preventing malocclusion.
DMF Rate	for the individual, the number of permanent teeth or for a group, the average number of permanent teeth which are Decayed, Missing or Filled.
def Rate	for the individual, the number of deciduous teeth or for a group, the number of deciduous teeth which are decayed, indicated for extraction and which are filled.
Dental Survey	is a collection of dental and related data in a group of people.
Dental Analysis	is an expression of the dental characteristics of a community population in terms of rates, percentages, averages and similar terms.
Program Planning	is the recommendation of specific dental health treatment, preventive and educational measures which are planned to improve existing dental and oral health conditions of the population in a community.
Budgeting	is the estimation of the cost of all the services of a dental public health program.
Evaluation	is a method of ascertaining the effectiveness of a dental public health program in noting any improvement in the dental and oral health of the entire population in a community from studying the annual analysis.

In this lecture, an attempt will be made to emphasize the importance of dental research in the teaching and practice of dentistry. Emphasis will be placed on research findings which have significantly influenced the mode of practice in dentistry.

What is Research?

Few references to research are as simple and as meaningful as those of Charles F. Kettering when he said, "Research is a high-hat word that scares a lot of people. It need not. It is rather simple. Essentially, it is nothing but a state of mind - a friendly, welcoming attitude towards change Research, for practical men, is an effort to do things better and not to be caught asleep at the switch." This type of attitude is nothing else but the natural activity of active, interested persons.

Major Dental Problems and Importance of Dental Research

From a public health standpoint, the three major dental problems are dental caries, periodontal disease, and mal-occlusions. Each of these three abnormal conditions of the hard or the soft tissues of the mouth are so prevalent in our population as to constitute major public health problems. Treatment of these abnormalities unfortunately does not impart to the patient freedom from subsequent attack. Treatment alone is not sufficient. The only answer is research in order to understand the causes of diseases, and hence, be able to prevent the abnormalities.

Dental Caries

The primary factors in the production of dental caries are:-

1. The tooth
2. Bacteria
3. Suitable substrate (food) for the bacteria.

Dental caries cannot occur without bacteria and the presence of a suitable food for bacteria. The bacteria contain chemicals called enzymes which act on "sugars" to produce acids. When a sufficient amount of acid is produced, the enamel of the tooth may break down. Therefore, dental caries would appear to be due to the following processes:-

1. Bacteria in the presence of refined, readily fermentable "sugars" produce acids in the mouth.
2. Acids acting on surface enamel cause decalcification.

3. Decalcification is the initial process of dental caries.

It is important to note that the bacteria producing dental caries are localized on the surface of the tooth in large numbers. They are able to break down sugars into acids very quickly - in a matter of minutes. Therefore, to be effective in preventing dental decay, brushing of the teeth must be done immediately after eating sweet foods.

Each of the above factors plays an important role in the determination of susceptibility of a person to this disease. Also, methods of prevention of dental caries logically fall into three categories - those which impart to the tooth a property which makes it more resistant to the processes of dental caries; those which influence the activity of bacteria in the mouth; and finally, change in the dietary habits.

The Vipeholm Dental Caries Study

The most important clinical study in the field of dental caries in the Vipeholm study in Sweden. Personnel engaged in work relating to the health of the oral cavity should be familiar with this work. The major findings of these studies relate to factors which influence the cariogenicity (caries producing potential) of food. These factors may be summarized as follows:-

1. The risk of "sugars" increasing tooth decay is great if the sugar is consumed in the form with a strong tendency to be retained on the surfaces of the teeth.
2. The risk of "sugars" increasing caries is greatest if the sugar is consumed between meals.
3. Caries activity will increase with an increase in the duration of sugar clearance from the saliva.
4. Withdrawal of "sugars" from a diet results in a decrease in caries activity.

Summary of Methods of Prevention of Dental Caries

1. Good wholesome food is essential in order to build strong teeth. Canada's food rules should be followed carefully. From a standpoint of dental health, it would be important to emphasize adequate intake of Vitamin D, Vitamin C, Vitamin A, and the proper calcium and phosphorus ratio.
2. Sticky, concentrated, easily fermentable "sugars" should be avoided in the diet.

3. It is of utmost importance to reduce the number of between meal snacks that children who are susceptible to dental caries have. Between meal snacks containing sweets should be avoided.
4. Immediately after eating, food particles and debris left in the mouth should be removed by thorough brushing and rinsing.
5. If it is not convenient to brush teeth after eating, the mouth may be thoroughly rinsed with water, or by eating a self-cleansing food such as an apple, an orange, or raw vegetables.
6. Communal water fluoridation is an important method of preventing dental caries.
7. The use of topical stannous fluoride application should be instituted when necessary.
8. The use of a dentifrice containing stannous fluoride assists in a modest reduction of dental caries.

Fluoridation

Studies in many parts of the world indicate a relationship between fluorides and dental health. In communities where fluorides are found naturally in the water supply, the population drinking the water has been found to have approximately two-thirds less tooth decay than populations drinking water without fluoride. Following this observation, many areas in North America and other parts of the world have mechanically adjusted the fluoride in their water supply so as to have a concentration of one part fluoride to a million parts of water. At this fluoride concentration, no systemic ill effects have been observed. Fluorides reduce dental caries by approximately two-thirds by building teeth that are more resistant to acid attack. The benefits of fluoride may be detected in all age groups that have consumed fluoridated water during the development of their teeth. Hence, the addition of fluorides to community water supplies is recommended as a most important public health measure to combat dental caries, and its sequelae.

Promising results in the partial prevention of dental caries also have been obtained by the direct application of fluorides to teeth. The use of stannous fluoride is particularly useful in areas where communal water supplies do not exist.

Dentifrices

Dentifrices are an important aid in good oral hygiene. However, claims that dentifrices which contain substances such as ammonia, chlorophyllin,

and other anti-bacterial agents, have a specific action on tooth decay, are not based on adequate testing. A dentifrice containing stannous fluoride shows promise in reducing dental caries beyond that caused by the mechanical cleansing action of the dentifrice and the toothbrush.

Future research may provide us with a suitable chemical that may "armour coat" a tooth and make it resistant to dental caries. At present, our most effective weapons against dental caries are fluoridation and rigid adherence to good eating habits, with emphasis on the reduction of stickysweets.

XXXI ASSOCIATIONS

This lecture is being given in the hope that you as dental assistants and potential assistants, will have some idea of the numerous groups and associations that participate in out-of-office activities, but which are all co-related to the profession of dentistry. For anyone joining the ranks of the profession, in any capacity, it is bewildering to be confronted with such an array of Associations and their many duties. It is our hope to simplify and explain how these groups all mesh together and how the interests of the public and the profession are controlled through these democratic styled organizations.

NATIONAL LEVEL

THE CANADIAN DENTAL ASSOCIATION

The Canadian Dental Association was first formed in 1902. It became incorporated and adopted its present constitution in 1942. It is recognized as the national organization of dentistry in Canada. The Federal Government recognizes the Canadian Dental Association as the representative body of dentistry in Canada both on the national and international level. Any business dealings with organized dentistry in Canada are done through the Canadian Dental Association.

Objects of The Canadian Dental Association to The Public

- (1) To educate the public in dental health matters.
- (2) Obligated to promote the field of research in dentistry.
- (3) To promote the arts and science of dentistry in its many branches.

Objects of The Canadian Dental Association to The Dental Profession

- (1) Pledges to maintain the honour and interests of the profession.
- (2) To elevate and sustain the character and the education of individual dentists.
- (3) To safeguard all the common interests of the members of the dental profession.

Canadian Dental Association Membership

Two types of membership make up the Canadian Dental Association.

Corporate members and individual members.

Corporate Members - Provincial Corporations such as the Royal College of Dental Surgeons of Ontario and there are ten of these, one from each province.

Individual Members - These of course are the individual member dentists in Canada of which there are approximately 5,700, Ontario making up about 2,500 of this number.

Funds are raised through a per capita fee or grant from the Provincial organizations, for the purpose of carrying on the professional and business activities of the National body.

How The Canadian Dental Association is Governed

The governing body of the National Association is called the Board of Governors, which is made up of the Executive Officers, plus board members who are representatives of the Provincial corporate bodies. Provincial organizations appoint or elect these representatives to sit on the National Board and each province is entitled to one board member plus an additional representative for every 500 registered dentists within the Province.

Administrative Officials of the C. D. A. are the Secretary, Deputy-Secretary, Treasurer and the Editor of the Canadian Dental Journal, with headquarters in Toronto at 234 St. George Street.

The Board of Governors meets annually, and as a rule it is conducted for four full days immediately preceding the annual convention of the Canadian Dental Association. The annual convention is held jointly with the annual meeting of one of the recognized provincial dental organizations and as a result the Canadian Dental Association annual meeting moves about from one province to the other, upon the invitation of the provincial organizations.

Between annual meetings, the Executive Committee, made up of the officers of the Association plus four members elected from the Board conduct the business of the Association.

The Board of Governors appoints special committees to carry on the work of the Association. Each committee has a Chairman who is required to present report at the annual meeting on the activities of that particular committee.

There are twenty-two such committees in existence at the present time, with approximately one hundred members serving on these committees.

Some Contributions of the Canadian Dental Association to Organized Dentistry

The Association has made contributions to the field of dental research through financial assistance to worthy students who wish to take post-graduate work in research procedures and teaching methods.

The Dental Public Health Committee of the Association has been instrumental in the field of public health education and has recently been very active in developing a Dental Health Index for Canada, by which the profession hopes to assess accurately its service obligations to the Canadian people.

- (3) The Dental Survey Team which is interested in improving dental education and trying to make instructions at the various dental schools in Canada follow a uniform pattern.
- (4) A very excellent library has been assembled at the Canadian Dental Association headquarters and its facilities are available to all members of the C. D. A.
- (5) The Canadian Dental Journal distributed throughout Canada is one of the finest periodicals of its type to be found anywhere and has a monthly distribution of about seven thousand copies.

PROVINCIAL LEVEL

At the provincial level we have two completely separate groups. The Royal College of Dental Surgeons of Ontario and the Ontario Dental Association, each with its own functions and duties. However there are many occasions when problems pertaining to the profession require the close-co-operation of the two groups.

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO

The Royal College of Dental Surgeons came into being in 1868 just one year after the Confederation of Canada. The Dentistry Act of Ontario was passed at the first session of the first Legislative Assembly in the Province of Ontario. It was through this Act that the Ontario Legislature conferred upon the dental profession itself the right to govern its own affairs. The Act, now in existence for over ninety years, confers upon the Royal College of Dental Surgeons of Ontario many responsibilities relative to the dental profession in this province.

From 1875 until 1925 the College served in a dual capacity, not only serving in a legal capacity, but also conducting the educational side through the School of Dentistry. This situation remained until 1925 when the School of Dentistry of the Royal College of Dental Surgeons became the Faculty of Dentistry, University of Toronto.

Although a person may be a graduate from a recognized School of Dentistry, this in itself does not give one the right to practise. A graduate must also receive a license to practise from the dental legal or licensing body of that province, namely the Royal College of Dental Surgeons. In order to practice dentistry in this province one must be a member of the Royal College of Dental Surgeons or as is more commonly known, a Licentiate of the R. C. D. S.

A member in good standing with the Royal College of Dental Surgeons receives other benefits along with his membership, such as automatic membership in the Canadian Dental Association, as the R. C. D. S. is a Corporate Member of the National Association. Another benefit to the practitioner is that he receives membership in the Dentists' Legal Protective Association of Ontario, which provides legal aid and advice in the event that any legal action be brought against a practitioner during the course of his duties.

Administration of the Royal College of Dental Surgeons

A Board of Directors consisting of nine members which are elected from the members of the College. The province is divided into eight electoral districts and once every two years the members practising in each district, elect one of their number to the Board of Directors. The ninth member of the Board is elected to represent the Faculty of Dentistry, University of Toronto. The Dental Act bestows wide powers to the Board of Directors, for the regulation of the dental profession in the province.

Duties of the Board of Directors

- (1) Sets up by-laws and regulations for the guidance of the profession and the protection of the public.
- (2) Sets requirements for applicants for membership.
- (3) Suspends or cancels licences of members.
- (4) Prosecutes those who attempt to practice without a licence.
- (5) Takes disciplinary action, when necessary, against its members.

Committees

Finance Committee

This committee has the responsibility of overseeing, the wise and careful handling of the funds entrusted to the Board. Funds for the financing of activities of the Royal College of Dental Surgeons are raised mostly through registration and annual licence fees. The Board of Directors provided grants to the Canadian Dental Association, along with other provinces to help with the numerous activities of that organization. The Ontario Dental Association is also given a grant to aid in its Dental Health Program.

Other grants are given to the Faculty of Dentistry, for scholarship, for teacher training and the Library support.

Discipline Committee

This committee serves as the conscience of the profession and should any member of the profession be guilty of transgressions against the ethics and principles of the profession, then it becomes a matter for the Discipline Committee to look after.

Examiners and Petitions' Committee

This committee deals with the applications from graduates of other Dental Schools and conducts licensing examinations. It also deals with the qualifications

of dentists desiring to enter the five recognized fields of specialization in Ontario.

Clinics and Extension Lectures Committee

This committee makes available clinical and lecture programs, to the approximately forty local dental societies and specialty organizations in the province, at no cost to the members of the participating societies. It would be almost impossible for some of these smaller local groups to exist without this aid.

Dental Services Committee

It was through the efforts of this committee that Canadian Dental Service Plans Incorporated was formed. This Company has been designed to administer plans for dental health care services. D. S. P. I. as it is called, administers two plans for dental services in the province. One plan is a Dental Welfare Plan which provides basic dental care to children who qualify within the Mothers' and Dependent Children's Allowances Act of Ontario. There are approximately twenty thousand children eligible for this service in the province. The Board receives a monthly grant from the Department of Public Welfare of the Province of Ontario based upon an agreed amount, for each beneficiary. The profession is now providing a very essential service to the people who would have great difficulty in obtaining it otherwise.

D. S. P. I. also administers a Post Payment Plan for dental services. This Plan allows people of moderate means to budget their dental services on a monthly basis with a minimum service charge.

There are many other committees and services which the Royal College of Dental Surgeons have an interest in and on which Board members serve, but this will give you some idea of the far reaching and all inclusive concern that this organization plays in the administration of a highly complex profession.

ONTARIO DENTAL ASSOCIATION

At the provincial level we also have The Ontario Dental Association which is the official voluntary organization of the dental profession in the Province of Ontario. The Ontario Dental Association was founded in 1867, and chartered by the Ontario Legislature.

Aims and Purposes of the Ontario Dental Association

- (1) To promote mutual improvement of its members and the advancement of the science of dental surgery.
- (2) To do all things incidental or conducive to the attainment of the above objects.

- (3) To enlighten and direct public opinion in relation to dental health and services.

Membership

Any licenced dentist in good standing and a resident of the Province of Ontario is eligible for membership.

Administration of the Ontario Dental Association

An annually elected Executive consisting of President, Immediate Past President, President-Elect, Historian and Archivist and a hired official Secretary-Treasurer. Combined with these Executive Officers is a Board of Governors, who serve for a three years period and are elected from the six electoral districts within the province.

Committees of the Ontario Dental Association

Dental Public Health Committee

This committee has done much praiseworthy work in an effort to keep the public informed as to good dental health care and procedures. To assist in this vital educational work the committee has produced books, pamphlets, slides and motion pictures, which are available through the offices of the Association.

Benevolence Committee

The work done by this committee is made possible through the voluntary contributions of the profession at large. As might be assumed this committee comes to the financial assistance of any member who might be confronted with problems due to certain circumstances beyond his control.

The Journal

This very fine periodical, which is published monthly, is distributed to every dentist in the province without charge. This Journal publishes such papers, comments, reports and announcements as may promote the advancement of dentistry and also reports the activities of The Ontario Dental Association.

Convention Committee

The organizing of the annual Convention held each May is the stupendous job of this group. Carefully chosen speakers present the latest concepts of dentistry through the media of essays, clinics, and motion pictures. The latest of dental equipment and materials are gathered together and presented for the consideration of the dental profession through extensive commercial exhibits.

LOCAL ASSOCIATIONS OR SOCIETIES

Now we have passed through the National and Provincial Associations within the dental profession we come to our local groups which may be termed as Dental Societies or as the group in Toronto is known as The Academy of Dentistry.

The size of these groups may vary according to locality, with some of the smaller societies having a membership of perhaps fifteen, while the Toronto Academy of Dentistry, with a potential membership of approximately 900 dentists is the largest group in the province.

Administration

These societies have a similar governing set-up as the aforementioned Associations. More specifically we will deal with the Toronto Academy of Dentistry, which has an elected group of Executive Officers and representatives from the four electoral districts into which the city is divided. There are two elected representatives on the Council for every 125 dentists in Metro Toronto. Due to the large membership and size of the city, three stated meetings of a scientific nature are held yearly; but more locally the East, West, North, and Central Dental Societies all components of the Academy hold four meetings a year.

Committees of the Academy of Dentistry

Winter Clinic Committee

Each November the Academy of Dentistry sponsors a very fine one day scientific program of essayists, clinicians and exhibits of equipment and materials. This event is known as the Toronto Academy of Dentistry Winter Clinic, with a wide attendance drawn from Metro Toronto and the adjacent cities and towns. Winter Clinic is one of the major projects of the Academy, and the committee headed by the President-Elect does an enormous amount of organizing to prepare the program.

Mediations Committee

This is a relatively new committee within the Academy. Its main objective is to settle amicably any dispute between the public and the profession due to mis-interpretation or misunderstandings by either the patient or the dentist.

Emergency Service

The dentists who man this service do so on a purely voluntary basis. The general public may receive continuous dental service twenty-four hours a day every day in the year by contacting the Academy of Dentistry.

Dental Public Health Committee

This committee does much to elevate the education and understanding of the public in dental public health services. This group is also the liaison at the local level, between the Dental Public Health Committee of the Ontario Dental Association.

Study Groups

The formation of Study Groups, which are small groups of dentists who gather together to study certain specialized areas of dentistry, are encouraged by the Academy.

THE CANADIAN DENTAL NURSES' AND ASSISTANTS' ASSOCIATION

The Canadian Dental Nurses' and Assistants' Association is the national Association of dental nurses and assistants in Canada. In number of years it is the youngest of our Associations, as it first began in Winnipeg in 1945. In May of 1957 it became an incorporated Association with its present constitution and by-laws. Much hard work and co-operation have been required by many members to give us a national association which includes nurses and assistants from coast to coast.

Aims and Objects

There are certain projects that the Canadian Dental Nurses and Assistants are bending their efforts towards at the present time. These in the main are to encourage provincial associations in some of the provinces where groups have not yet been formed and to raise the level of education of the dental assistant in so far as it is possible.

Administration

The Canadian Dental Nurses' and Assistants' Association usually meets annually in conjunction with the Canadian Dental Association and as guests of one of our provincial Associations. The constitution calls for an elected slate of Executive Officers, plus a House of Delegates, which consists of the representatives from the various provinces. The number of delegates is ascertained by the number of members in each provincial association. At this yearly meeting the business of the Association is discussed and an Annual Meeting is called with the officers and convenors of the association giving reports of the various activities during the year.

Fees

The funds to carry on the business of the Association are raised by means of an annual membership fee.

Bulletin

Contact with the members is maintained through the means of a published Bulletin, which reports on Conventions held, provincial news and anything that might be of interest to dental assistants. This publication is sent to each member across Canada.

As has been explained this group is fairly new in comparison to some of our incorporated provincial Associations; but it has come far in a short time and we are sure it will make many fine contributions in the future to the field of dental assisting.

PROVINCIAL ASSOCIATIONS

THE ONTARIO DENTAL NURSES' AND ASSISTANTS' ASSOCIATION

Provincial Associations are governed according to their own provincial incorporation by-laws so long as they do not run contrary to the by-laws of the Canadian Dental Nurses' and Assistants' Association. Provinces which have not been incorporated may adopt the by-laws of the C. D. N. & A. A. to facilitate the administration of their associations.

The Ontario Dental Nurses' and Assistants' Association was incorporated under the laws of the Ontario Legislature in 1934.

Aims and Objects

To promote good fellowship and unity of the Dental Nurses' and Assistants' in the Province of Ontario and to advance the interests of the members of the Association and to do all such other things as are incidental or conducive to the attainment of the above objects.

Administration

The governing body of the Ontario Dental Nurses' and Assistants' Association is called the Board of Governors, which consists of an elected slate of Executive Officers, plus representatives from the local Affiliated Associations within the province. The representation is determined by means of the number of paid-up members in each local group.

There are five Board of Governors' meetings a year, which are usually held over a week-end as a matter of convenience for the members who come from all parts of the province. The purpose of these meetings is to discuss and arrange the business of the Association. To facilitate the business of the Association there are committees and convenors appointed, who in turn report their findings and suggestions back to the Board for their consideration. Once a year an Annual Meeting is called, at which time the Board of Governors reports the

activities and achievements of the year to the general membership. It is at this meeting that the financial statement is given and any changes in our by-laws are voted on.

Committees of the Ontario Dental Nurses' and Assistants' Association

(1) By-Laws Committee

Being an Incorporated association we are governed by a set of by-laws, which might be called the rules and regulations, governing the actions of our associations. From time to time circumstances require that additions and amendments be made to keep the by-laws up to date. It is the duty of this committee to look into such matters and should they be necessary see that they are carried out in accordance with the proper procedures governing our Association.

(2) Budget and Finance Committee

Our Ontario Association raises the funds necessary to run the business of the Association by means of an annual membership fee. This fee is paid at the local level, from this fee a stated amount remains with the Affiliated Chapter, and the remainder is forwarded to the Provincial Association. It is the duty of this committee to draw up a yearly budget so that our finances remain on a sound basis.

(3) Educational and Certification Committee

This committee was formed in an effort to find feasible ways and means to raise the educational standards of dental assistants and to give them some recognition and status. At one period the Ontario Association sponsored what was known as the "Pilot Model Study Courses" which were organized in several of the large Affiliated Chapters and they proved to be relatively successful. More recently we have worked in co-operation with the Royal College of Dental Surgeons and the Local Dental Societies to help establish Evening Course for Dental Assistants. In 1961 the O. D. N. and A. A., with the approval of the Royal College of Dental Surgeons inaugurated throughout the province a program of Certification for dental assistants. This program has been run in conjunction with the Evening Courses for Dental Assistants and has supplied the academic portion of the necessary requirements for certification.

This program has been exceedingly well received and we are gratified at the results. From time to time as the need and the facilities are available our program will be expanded to take care of the situation.

(4) Honorary Life President

Honorary Life President was bestowed on Mrs. Marion Edwards for

her work in organizing Associations for dental nurses and assistants both on the provincial and national level.

At the present time we have eleven organized Affiliated Chapters in various cities in Ontario. We also have a group of Independent Members, who are dental assistants in small towns and communities, who are too widely dispersed to form a proper affiliated chapter.

(5) Bulletin

We have a provincial publication called the Bulletin which is sent to each member. The Bulletin publishes articles and suggestions relative to dentistry, some of which are written by our members, and others that our editor feels might be of value to a dental assistant. News items are printed to increase interest and enthusiasm among our local chapters. By means of our Bulletin we publish in advance any change in our by-laws and publicity for our Annual Convention. Further publicity concerning activities of the Affiliated Chapters is published in the O. D. A. Journal through the courtesy of the Ontario Dental Association.

(6) Convention

Our annual convention, held in conjunction with the Ontario Dental Association each May, is one of the highlights of our Association year. Our Convention began in a very small way but it has grown into a three day affair with a fine scientific program, with speakers from Canada and the United States, speaking on all phases of dentistry. Our own members present many fine Table Clinics and Special Contests are conducted. It is during this Convention, when members from all over the province are present that we hold our Annual Meeting with our election and installation of officers.

There is also a social side to our Convention, with a Sunday evening reception, a banquet, at which our trophy awards are presented, and a closing.

We are proud of our Convention and the Convention Committee who organize the Program spend many hours of their time to give us the finest affair of this kind possible.

LOCAL OR AFFILIATED CHAPTERS OF THE ONTARIO DENTAL NURSES' AND ASSISTANTS' ASSOCIATION

The Local or Affiliated Chapters of which there are eleven at the present time in Ontario are the backbone of the provincial associations. The size of the Affiliated groups varies from city to city as can be readily understood. However it has not been the number but the spirit that has been the important factor in

forming these dental nurses and assistants into local associations.

Administration

Each Affiliated Association is governed and directed by the constitution and by-laws of the provincial body. An annually-elected slate of Executive Officers is required plus sufficient convenors to fulfill the duties necessary to the successful administration of the business of that association.

Membership

Any woman who qualifies under the terms of membership as set by the Provincial Association may join an Affiliated Chapter. Payment of annual membership fee gives automatic membership in the Provincial Association.

It is the keen desire of our Association to encourage good fellowship and interest between members engaged in the field of dental assisting. With this in mind the Affiliated Chapters conduct monthly meetings in various cities and communities of the province. The diversified programs are planned so that the members may have the benefit of increasing their knowledge and ability. Along with the scientific part of the programs several social functions are arranged each season. Each Affiliated Chapter, where ever it is possible, try to organize some type of charitable work in which their member participate. Our annual Convention in May is the combined effort of all individual chapters, with the result that the convention is the highlight of our Association year.

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